Engineering Library

MAR -5 1920

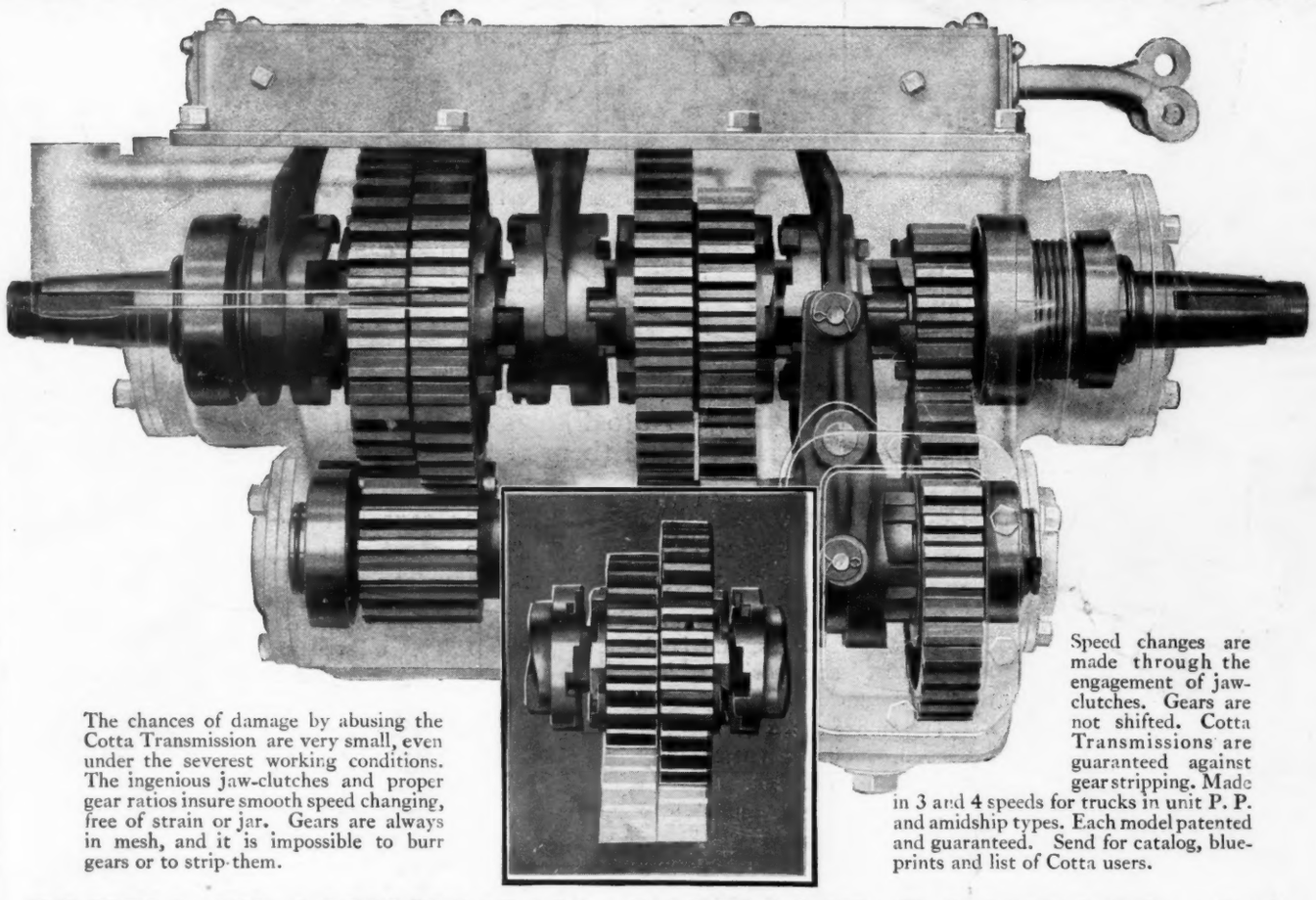
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLII
Number 9

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, FEBRUARY 26, 1920

Twenty cents a copy
Three dollars a



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AUTOMOTIVE INDUSTRIES
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VOL. XLII NEW YORK—THURSDAY, FEBRUARY 26, 1920 No. 9

Technical Features of the Fifth National Tractor Show

Tractor development of the last year has been in small details, refinements and in making the mechanical parts more accessible, so Mr. Heldt found in his study of the old and new models at Kansas City. In this article he points out the changes on the older machines and the features of new designs.

By P. M. Heldt

THE Fifth Annual National Tractor Show did not mark any radical technical departures. True, there were a good many new models shown by firms which have not yet become familiar in the industry, but practically all of these new models are assembled machines, comprising stock engines, transmissions, axles, etc.

There are no less than thirteen stock engines on exhibition and any concern wishing to take up tractor manufacture has a wide choice. The variety and general excellence of the engines offered to tractor manufacturers should lead them to think twice before deciding to manufacture their own engines, especially in view of the difficulties involved in producing a successful kerosene-burning engine. The manufacturers of stock engines exhibiting are as follows:

Beaver Mfg. Co., Milwaukee, Wis.
The Buda Co., Harvey, Ill.
Chief Motor Corp., Port Huron, Mich.
Climax Engineering Co., Clinton, Iowa.
Erd Motor Co., Saginaw, Mich.
Hercules Motor Mfg. Co., Canton, Ohio.
Le Roi Co., Milwaukee, Wis.
Midwest Engine Co., Indianapolis.
Stearns Motor Mfg. Co., Ludington, Mich.
Waukesha Motor Co., Waukesha, Wis.
Weideley Motors Co., Indianapolis.
Wellman-Seaver-Morgan Co., Akron, Ohio.
Wisconsin Motor Mfg. Co., Milwaukee, Wis.

Of the above concerns only the Wellman-Seaver-Morgan Company is new in the motor field. This firm will manufacture an engine designed by Joseph Van Blerck, formerly president of the Van Blerck Motor Co., whose marine motor designs have long been well known. This engine, which is of the overhead valve, all enclosed, force feed lubrication type, will be used on a tractor to be manufactured by the Wellman-Seaver-Morgan Co. and will also be made for the market.

The one important departure in tractor design noticed this year is the adoption of independent rear wheel brakes on a great many tractors. In the course of the year tractor manufacturers generally seem to have "tumbled" to the fact that such brakes

are a great help in steering the machine. It must be realized that when a tractor is pulling a full load only about 10 per cent of its weight rests on the front wheels, and if the ground happens to be soft or wet the front wheels are apt to skid and the tractor will refuse to follow the operation of the steering wheel. If by means of the independent brakes, the inside wheel can be locked and power applied to the outside wheel only, the tractor will practically pivot around the inside wheel and effect a short turn.

It has also been found that the individual brakes are a help in plowing if one wheel runs in the furrow. Under certain conditions the wheel in the furrow gets a much better grip than the other one, and by applying the brake lightly to the latter the drive will be equalized.

Four Cylinder Upright Engine

In connection with stock engines it is worthy of note that all of these are of the four-cylinder, upright type, although two-cylinder horizontal engines continue to be used extensively by the old-line manufacturers. Stock tractor engines, moreover, have many other points of similarity. For instance:

Nearly all are of the valve-in-head type, the valves being actuated by enclosed valve rods. The whole valve mechanism is enclosed and well lubricated.

Force-feed lubrication of the crankshaft and connecting-rod bearings is the rule.

The later engines are all of heavier type than the four-cylinder or automobile type engines formerly used and the two classes of engines used in the tractor industry, the one developed from the stationary engine and the other from the automobile type, are gradually approaching closer to each other as regards weight. A heavier engine means larger bearing surfaces for a given cylinder displacement and a more rigid support of the bearing. As one tractor manufacturer put it about a year ago:

"A tractor engine should be so ruggedly built that it cannot be abused by any amount of load that can be placed upon it. The bearings and all parts should stand up, even if they were carrying a 100 per cent load all the time."

The number of new exhibitors caused much comment, and those most familiar with the history of the tractor development were those who expressed surprise that so many new companies should venture into this field. These persons assert that the sales force is more potent to the success of a tractor than the design, and they point to the success of some of the old lines as proof of this view. These companies, with excellent sales forces, have made a success of tractors that have little to recommend them in the way of design. These companies, as a rule, have a line of specially designed implements, and their sales campaign is national, if not international. The newcomer, however excellent may be the design of his tractor, lacks the ability to meet the consumer in competition with these sales organizations of long standing. The tractor business is so new that dealers are not to be had by asking for them, but they must be made, as few men not actively engaged in the business have the knowledge requisite to become a tractor dealer.

On the other hand is the fact that all the necessary components, including engine, clutch, transmission, magneto, air-cleaner, carbureter, wheels, axles, radiators, etc., can be bought in the open market, and comparatively little capital and engineering skill is required to get a start in the business. As a matter of fact, it is far easier to get into the tractor business than to stay in it.

Driving lugs are still receiving the attention of inventors. A retractable lug similar to the one seen on a German artillery tractor exhibited at Ottawa Beach, Mich., last summer, was exhibited by the Hoosier Wheel Co. The lug is in the form of a spade, which, by means of an eccentric mechanism, can be made to protrude from the rim a distance of three inches, or can be partially or wholly withdrawn at the contact surface. The advantages of such a lug are obvious.

On the Kardell tractor was shown a lug which fits diagonally across the wheel rim. It hooks into a hole in the rim on one side and a latchpin, backed up by a coiled spring, which pin can be withdrawn by means of a handle, fastens it on the other side. Thus the lug can be removed by pressing down the latch handle and then wrenching the lug out of position—if the latch bolt is not rusted in place.

Little attention seems to be paid as yet to the operator's comfort. One or two tractors have upholstered seats, but the majority of makers seem to consider the pressed steel agricultural seat plenty good enough.

Some manufacturers have eliminated fan belts altogether because, they say, the farmer will not take the trouble of adjusting the belt and will allow the engine to overheat as the result of a slipping belt. Others, including Hart-Parr, have combined the fan and pump drive, using a wide, flat belt for the purpose. Using a single drive for the two accessories simplifies the construction and increases the factor of safety rather than reducing it, as the additional power required, due to the pump drive, is very slight and the belt will be made wider and better tensioning means will be provided.

One of the new tractors, the W. S. M., will be furnished with an electric starter and electric lights as regular equipment. Several other manufacturers show electric lights fitted, but do not furnish them as regular equipment.

The line-drive principle is gaining in popularity. It is not now intended as a device to make the farmer believe it is as easy to drive the tractor as to drive a team of horses, its advantage being that it permits of operating the tractor from the implement, which is necessary in order to make a one-man outfit for operating a binder, manure spreader, etc. One firm exhibits a line-drive appliance for application to the Fordson. One pair of lines running over a large sheave secured to the steering post serves for guiding the tractor, and another pair, of which one is thinner than the other, for controlling the throttle and the clutch.

The Dust Nuisance

The field for attachments to the Fordson tractor is beginning to be exploited and promises to become almost as expensive as the Ford automobile accessory business. There are four or five exhibits at the show featuring such attachments.

The dust nuisance is responsible for some of the improvements in design. The dry type of air-cleaner has proven inadequate in certain districts, as it will not remove the very fine particles of dust floating in the air, and some form of air-washer is almost invariably used. There is a tendency toward the use of dust caps on wheel hubs, which formerly were considered non-essential. In the new Hoosier tractor a dust shield is fitted at the forward end of the engine, which prevents the dust-laden air drawn in through the radiator from being blown all over the engine and its accessories. On this same tractor the engine exhaust is discharged into the bull gear cases, which tends to maintain a slight excess of pressure therein, and a constant escape therefrom through all openings, thus preventing dust from entering.

The designer also asserted that the carbon carried in the exhaust formed a natural lubricant for the bull gears, and was desirable from that point of view. This idea was also carried out in the design of the Square Turn tractor.

Following are some notes on changes made by the older makers in the course of the year:

The Dart

ON the Dart the position of the wheels has been changed so that the inside edges of the front and rear wheels are in alignment. This makes it possible to run with the inside wheels either in the furrow or on unplowed ground. The concern now uses a Detlaff dry disk clutch and its own make of three-speed gear, which gives a direct drive of 2½ m.p.h., as well as one lower speed for emergencies and one higher speed for light work. The control mechanism is carried in a side plate and can be removed as a unit. There are three parallel shafts in the gearbox, the upper one carrying the bevel gear for the power take-off, and also a sliding gear for the same purpose. The power take-off can be easily removed. A breather is provided on top of the transmission case. The front axle radius rods are now made separate instead of in wishbone form, so that in case of breakage each can be replaced separately.

The new Buda Model YTU engine is fitted, as are a heavier radiator core, an RHW Parrett type air-washer and a heavier front axle. The belt pulley is secured on a tapered seat and can be readily removed.

The Bullock and the Wallis

THE Bullock Tractor Co., of Chicago, manufacturing a chain track type of tractor, is specializing on its 18-30 hp. model, which is being sold mainly for industrial purposes, including road construction, oil field transportation, logging, house-moving, bridge-building, general contracting work and for clearing land.

The Wallis Tractor Co. has adopted the Twin Disk clutch and fits Timken bearings on both sides of each large gear in the rear axle, so there is no overhang of the gear which always results in large bearing loads.

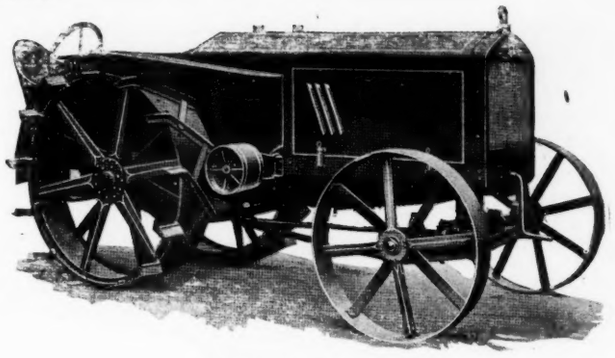
The Waterloo Boy and the Cletrac

THE Waterloo Boy has the pump and fan on the same shaft and driven by a 2 in. flat belt where formerly a V belt was used for the fan. The crankshaft counterweights are placed outside the crankcase.

A larger engine is supplied in the Cletrac chain track tractor, the bore being increased ¼ in. Four rings are fitted to each piston instead of three. An improved three way force feed oiling system is one of the new features, the oil being forced through a separate lead to each of the main bearings. The track has been widened to give 800 sq. in. of supporting surface instead of 600, and a larger driving axle is fitted.

The Case and the Automotive

THE J. I. Case T. M. Co. is showing its 22-40 hp. model for the first time. This concern has revamped its whole line, using the 10-18 hp. model as a pattern. The new 22-40 is similar to the 10-18 in every respect except that the cylinders are cast in pairs instead of in a block. This is a 4-5 plow tractor suitable for operating a 32-54 separator and weighs complete 9200 lb. All of the engines of the Case line have removable cylinder sleeves.



Uncle Sam tractor

The line-drive tractor made by the Automotive Corp. of Toledo, O., is fitted with a Hercules 4 x 5⅛ in. four-cylinder engine and employs open, or spoked, wheels instead of the disk wheels with which it was shown last year. The fan is enclosed, so that it will draw air through the whole of the radiator. The machine has been lengthened one foot, the new wheelbase being 75 in. Gridiron Grip wheels are fitted. An automatic lock is provided on the gearshift, so the gears cannot be shifted into mesh unless the clutch is disengaged. For steering there are two Carlisle-Johnson friction clutches enclosed in a housing, one or the other of which can be engaged by means of the control lines. There is a separate clutch (of Lasure make) in the belt pulley, and the pulley is so arranged that it can be transferred from one side of the tractor to the other. Kerosene can be used for fuel.

The Fitch Four

THE Fitch Four Drive Tractor which is manufactured in Big Rapids, Mich., was exhibited for the first time. As its name indicates, it is a four wheel driven machine, and it belongs generally to the class of assembled tractors, although the drive to all four wheels involves original features. The engine is Climax and the transmission Cotta. To the rear axle, the power is transmitted by a Timken worm drive. The front axle is pivoted at its center for steering, and like the rear axle, is a live axle, the drive to it being by two pairs of bevel gears in series, the intermediate gear and pinion being on a vertical shaft concentric with the pivot support of the axle. There is a differential gear in each axle but none in the shaft driving to the axles. There are three forward speeds, viz., 1½, 2½ and 4 m.p.h., the corresponding reduction ratios being 80 to 1, 50 to 1 and 32 to 1. The tractor has a rating of 12-35 and weighs 6000 lb.

The Uncle Sam

THE Uncle Sam, manufactured by the U. S. Tractor and Machinery Co., Menasha, Wis., has a Beaver engine, Twin Disk clutch, Bennett air-cleaner, Bennett carburetor, Dixie magneto, Duplex governor, Sylphon thermostat and Nuttall transmission. A noteworthy feature is that, although the transmission and engine housing are bolted together to form a backbone frame structure, a separate frame of comparatively light design is used. At the front, the frame is swiveled at the center of a short cross spring. There is a barrel type of valve in the exhaust line which permits of branching either all or any part of the exhaust gases through the carbureter for vaporizing the kerosene. This tractor, according to the makers, weighs only 4000 lb. and is capable of a drawbar pull of 3000 lb. It has two forward speeds, of 2½

Traylor Tractor

and 3¾ m.p.h. respectively. An upholstered seat with high back is provided for the driver.

The Traylor

A LIGHT tractor or combination tractor and cultivator is exhibited by the Traylor Engineering and Manufacturing Co. of Cornwells, Pa. This machine which has a 6-12 hp. rating, is designed to pull either one 12 inch or two 10 in. bottoms, being capable of exerting a drawbar pull of 750 lb. It is claimed that from 10 to 14 acres of corn can be cultivated with it in a day. The ground clearance is 26 in. The weight is approximately 1700. The final drive is by exposed bull gears. Most of the weight of this tractor is located rather far forward, which would tend to reduce the ground adherence of the drivers. The tractor is a regular 4-wheel construction and the cultivator beams are attached to the frame side members near the front so that the cultivating attachment is always in sight of the driver.

Hoosier

THE Hoosier Tractor, a 20-35 hp. model, comprises a 4-cylinder Pittsburgh Model engine (4½ x 6 in.) an M. & E. dry disk clutch, a Cotta transmission, Wohlrab steering gear, Bennett carbureter, Dixie magneto, Splitex radiator, Pierce governor, Bennett air cleaner, Cullman differential and Oakes fan. The front axle is built up of flat steel and the frame is supported on it at the middle through the intermediary of a coiled spring. Special attention has been given to the problem of protecting the mechanism from dust. The air drawn through the radiator is not blown over the engine, there being a dust shield between the engine and fan, and the exhaust from the engine being discharged through the driving gear housings, thus maintaining a slight over-pressure in the housing, tending to keep the dust out. Comfort for the driver has also been considered by the designer, the machine being equipped with a truck type steering gear and upholstered spring seat, and all levers are within easy reach. Fuel economy is claimed as a result of the wheels with adjustable lugs. The plowing speed is 2.5 m.p.h. and two other forward speeds of 1.25 and 3.75 m.p.h. are available. The net weight is said to be only 3500 lb., which is very unusual for a 3-plow tractor.

Triumph

THE Triumph tractor has an exposed final drive by bull gears. It is a 3-bottom machine fitted with a 4¾ by 6 in. Erd engine. The horsepower rating on the draw bar is 18 hp. and on the belt, 36 hp. The engine is a valve-in-head job, with inclosed governor, Dixie magneto, Kingston carbureter and Bennett air cleaner. The frame is channel steel, with the front end carried on the axle by a half-elliptic cross spring. Steering is on automobile lines, with the tie rod in front of the axle. The front wheels are 30 in. in diameter and the rear wheels 48 in. All are mounted on Hyatt roller bearings. The forward speed of the tractor is 2¼ to 2¾ m.p.h., with a reverse speed of 2¼ m.p.h. With lugs and the tanks filled the machine is said to weigh 5000 lb. It is made by the Triumph Truck & Tractor Co.

Wetmore

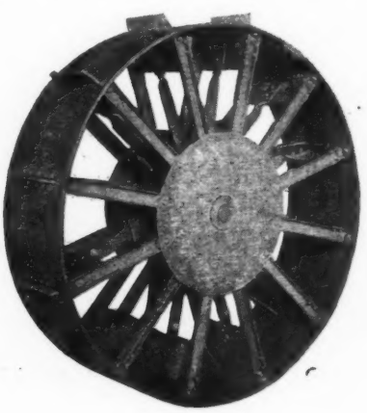
THE Wetmore tractor, which made its first appearance at the Wichita demonstration last year, is a two-plow machine of simple design. One of its features is ease of control, all pedals and hand levers being convenient to the operator, with plenty of room for the latter's feet. The spark and throttle levers are on the left side within easy reach.

The engine is a Waukesha, 4 by 5¾ in. with a normal speed of 960 r.p.m. It is lubricated by a gear pump and ignition is by a high-tension magneto. Anti-friction bearings are used throughout and all gears are protected from dust and run in oil. The rear axle is Torbensen internal-gear drive and equipped with Timken bearings. There are three forward speeds, the intermediate one being a direct drive. This is the plowing speed of 3 m.p.h. The high speed, or 5 m.p.h., is for road work, while the low speed of 2 m.p.h. is for plowing in heavy soil and for emergencies.

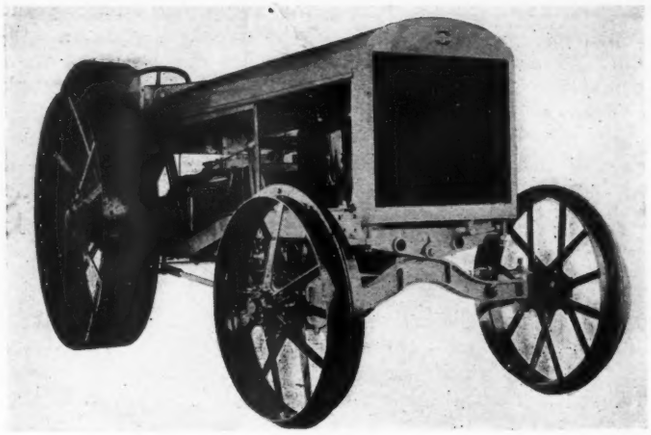
An automobile type steering gear is used. The tractor has a 17 in. clearance at the rear axle and 12½ in. at the front axle. The wheelbase is 74 in. and the tread 53 in. The engine is protected by a well-fitting hood, while the operator is protected by the fenders and inclosed sides. The machine was shown by H. A. Wetmore.

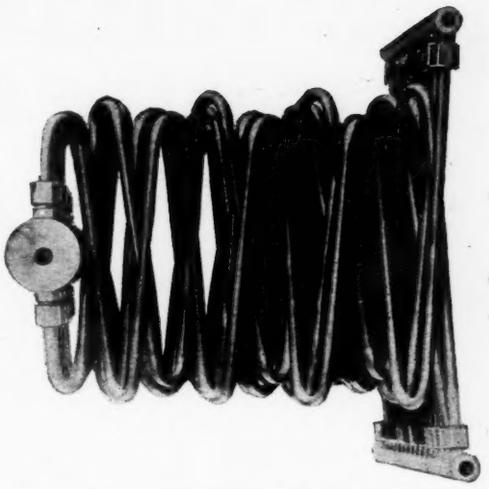
Bryan Steam Tractor

ONE of the new tractors that acted as a magnet to the crowds was the Bryan light steam tractor. Its features comprise a high pressure superheated steam boiler,



Hoosier tractor and wheel with adjustable lugs





Bryan tractor and tube type boiler

with a steam atomized fuel burner which will burn the very lowest grades of fuel, it is claimed.

In outward form this tractor resembles many of the inclosed gasoline engine driven tractors. A steam condenser takes the place of the front radiator.

The boiler is located under the hood, immediately to the rear of the condenser, and is of the water tube type. Water legs run fore and aft and are connected to a steam dome above by thirty-four seamless steel tubes which are bent in zig-zag form to provide sufficient tubing and to counteract any tendency toward disruptive expansion. The steam dome located in the top of the boiler where the hot gases from the burners can play directly upon it, forms a superheater, which together with the dry pipe located in the steam dome assures dry steam at all times it is claimed.

A two cylinder double acting steam engine is located horizontally, directly back of the boiler. The engine is completely enclosed and geared to an intermediate spur gear that drives the countershaft on which is located the pulley. This shaft drives the differential ring gear through another spur gear.

Variation in the power and effective tractive effort of the machine is effected through the Stephenson link motion which controls the cut-off of the steam valve. This valve is of the piston type, and since it is balanced there is no wearing of the valve seat due to unequal pressures on the valve.

The engine has its two 4 x 5 in. cylinders cast in a block with the two piston valve chambers. Regulation of the boiler feed is accomplished by a small valve under the hand of the operator. The feed water pump is driven from a gear on the pulley shaft. Incorporated with this drive are two other pumps, for the fuel and the lubricating oil, respectively. The lubricating oil, which is fed into the boiler with the feed water, serves to prevent the accumulation of scale in the tubes, then it passes on to the engine.

Two 35 gallon tanks are carried under the frame for fuel and water. A small three gallon tank supplies gasoline for the pilot light which burns continuously and which serves to keep the burner warm. Atomization of the fuel is accomplished by exhaust steam from the small steam turbine which is used to drive the fan.

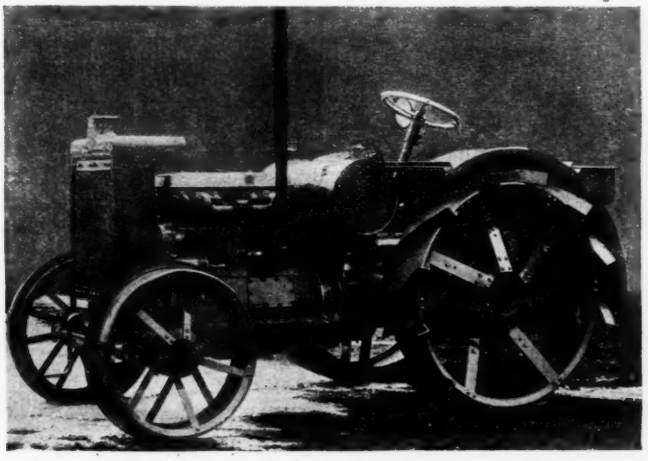
Wellman-Seaver-Morgan

A TRACTOR of the most up to date type was exhibited by the Wellman-Seaver-Morgan Co., a large machinery concern that has recently entered the manufacturing of tractors and tractor engines. The tractor engine was designed by Joseph Van Blerck, who has had much experience with marine gas engines and the tractor was designed by John Riise, who formerly was connected with the International Harvester Co.

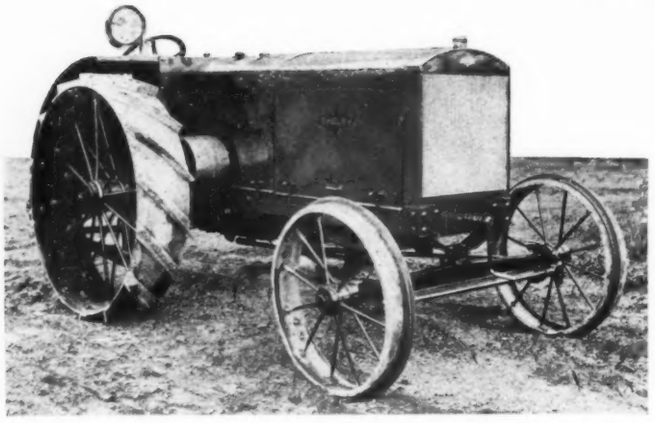
The engine is a 4-cylinder upright type of 4¾ in. bore and 6 in. stroke. While the engine develops 45 hp. on the test stand on kerosene, the tractor is conservatively rated at 15-30 hp. Among the features of the engine are valves in the head, removable cylinder sleeves, centrifugal governor, gear driven fan and force feed lubrication, the latter extending even to the valve rocker arms. An air cleaner of the washer type is placed on top of the engine. Ignition is by high tension magneto. A three speed and reverse transmission of the original design is used, the intermediate speed being a direct drive and the high speed geared up. The three speeds are 1½, 3 and 6 m.p.h. respectively. All plowing is intended to be done on the intermediate speed. When this is in operation there are only two gear reductions to the rear axle, a first reduction by worm and wheel and a second reduction by spur pinion and gear. The first reduction gear is located back of the rear axle, which makes for a short wheelbase and has the further advantage that the transmission unit practically balances around the rear axle and therefore can be handled easier in disassembling.

This tractor is of the backbone type, having no frame. It is fitted with independent rear wheel brakes to help in steering. These brakes can be operated either by hand or foot and can be locked in position when set by means of a simple chain lock.

Motor starter and electric lighting outfit are regular equipment. A feature of the whole design is that the tractor is made up of a certain number of units which



W. S. M. tractor



The Shelby tractor

can be assembled separately before the assembly of the tractor itself is started. These include the motor unit, front axle unit, clutch unit, pulley unit, steering gear unit and differential unit.

The wheelbase is 75 in. and the wheels are 32 x 8 and 48 x 12 in., front and rear respectively. The demonstrating model weighs about 6000 lb. but it is hoped that in regular production to get the weight down to 5500 lb.

The Toro

THE Toro Motor Co. last year introduced a motor cultivator and this year it shows in addition a light tractor employing the same size power plant. This is a 4-cylinder 3⅛ x 4½-in. engine with thermo-siphon circulation, governor control, circulating splash lubrication and high tension magneto ignition. The tractor is of the frameless or backbone type and is probably the smallest of this class that has been built. A duplex contracting band type of clutch is used. No change of gear is provided, which makes the construction simpler than that of the average small tractor. In light soil the tractor will pull two 10- or 12-inch plows but for heavy soil plowing the manufacturers recommend a single 14- or 16-in. bottom. The drive wheels are 42 x 6 in. and the track (center to center of drive wheels) is 32 in. The drive wheel can be raised and lowered for running in the furrow. A semi-enclosed worm and segment type steering gear is fitted. The turning radius is 105 in. and there is a ground clearance of 10½ in. The tractor weighs approximately 2300 lb.

The Shelby

TWO tractor models were exhibited by the Shelby Tractor & Truck Co., with 9-18 and 15-30 hp. ratings respectively. The smaller machine, Model C, has a Waukesha 4-cylinder 3¾ x 5¼-in. engine, a multiple disk in oil clutch and a sliding gear transmission giving three forward speeds and one reverse. The final drive is by internal gears enclosed in dust-proof housings. This tractor pulls two 14-in. plows and weighs 3500 lb. with tanks filled. The three forward speeds are 1¾, 2.6 and 4¾ m.p.h. and the intermediate speed is, of course, the regular plowing speed. The wheelbase is 67 in. and the tractor can be turned in a 6½-ft. radius. Provision is made for burning either kerosene or gasoline, the fuel tank having two compartments, of 12- and 5-gal. capacity respectively. The front axle is of cast steel, with I-beam section. Steering is effected by means of a heavy truck type steering gear.

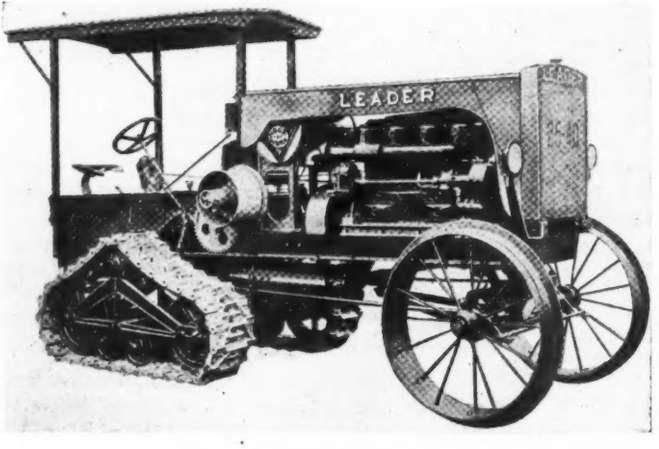
The 15-30 model carries a 4-cylinder, 4½ x 6-in. kerosene engine of the inclosed flywheel type with three-point suspension. Lubrication is by the circulating splash system. An enclosed governor holds the engine down to a normal running speed. A Bennett air cleaner is fitted, together with a Kingston carbureter, high tension magneto and Modine radiator with 20-in. fan. This model has a Foote transmission giving two forward speeds, a low speed of 2.7 m.p.h. and a high speed of 4 m.p.h. The sliding change speed gear is built in a unit with the live axle, and the final reduction is by planetary gears at the wheels. Fourteen gallons of kerosene and 4 of gasoline are carried in a tank under the hood. This model has an 80-in. wheelbase and turns in a 7-ft. radius. Its weight is 4600 lb. and it pulls three 14-in. plows. The drawbar is attached to the under side of the rear axle and is provided with a heavy coiled spring to absorb the shock in starting heavy loads.

The Leader

A NEW model by an old concern in the tractor field is the Leader 16-32, made by the Dayton-Dowd Co. It has a Climax 5 x 6½-in., 4-cylinder engine, Bennett air cleaner, Stromberg 1½-in. carbureter, Dixie high tension magneto and large cellular radiator with pump and 22-in. fan. A Borg & Beck 12-in. dry plate clutch is fitted and the transmission is a selective sliding type giving two forward speeds—2¼ and 3 1/3 m.p.h.—and one reverse. The gearshafts are mounted on Hyatt roller and New Departure ball bearings. The final drive is by internal gears to the rear wheels, the drive being enclosed. The rear axle is of the live type, 2 15/16 in. in diameter. It is mounted in Hyatt roller bearings and runs in a housing containing a bath of oil. The front axle is built up of heavy angles and bars and provided with automobile type steering knuckles. The frame is supported on the front axle on springs and is swiveled on it so as to afford flexibility. Six-inch heavy channel steel is used for the frame, which is strongly braced. The wheelbase is 76 in. and the turning radius 15 feet. The weight empty is 5800 lb. There is a sheet metal housing over the engine which runs out into the rear wheel fenders, but the engine space is entirely open on both sides so as not to interfere with access to the engine.

The Tioga

THE Tioga Mfg. Co., one of the newcomers in the tractor industry, exhibited a four-wheel tractor rated to pull three 14-in. plows. It is partly assembled, having a Wisconsin 4-cylinder, 4½ x 6-in. engine governed to run



The Leader tractor

at 1000 r.p.m. Lubrication is by the force-feed system. Gasoline is used as fuel and is fed by gravity to the 1¼ in. Stromberg carbureter. Ignition is by Dixie magneto with impulse starter. The cooling water is circulated by a centrifugal pump through a G. & O. radiator mounted at the front of the tractor, behind which there is a fan. The transmission is of the company's own design, of the sliding gear type, and gives two forward speeds and one reverse. A Dorn-Miller differential is incorporated in the transmission assembly. The final drive is by enclosed bull gears. A power take-off is built together with the transmission, the belt pulley being 12 in. in diameter by 7 in. in width of face. Ball and roller bearings are used throughout. On the high gear the reduction is 29:1 and on the low 40:1. The tractor has a wheelbase of 79½ in., turns in a radius of 12½ ft. and weighs complete 4950 lb. It has a 15-27 hp. rating.

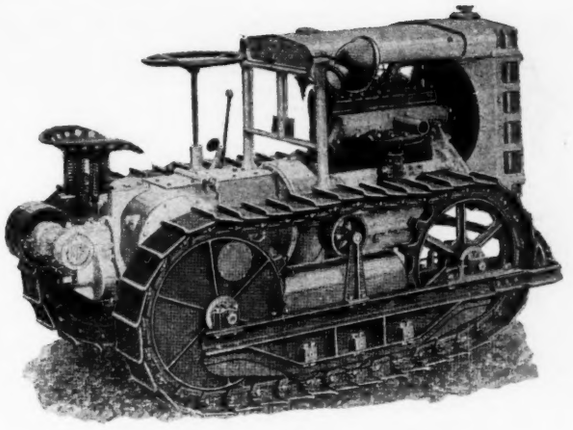
The row crop cultivator is viewed by many engineers as the natural complement of the tractor on the farm. It takes the second heaviest bit of labor off of the horses and with the tractor and truck will motorize the farm for the heavy labor. Three new cultivators were exhibited.

The J. T.

THE J. T. tractor is a crawler type which has been under development by the J. T. Tractor Co. for several years. The latest design, Model N, has a 4-cylinder 4¾ x 6-in. engine which gives 35 hp. at 800 r.p.m. and 40 hp. at 1000 r.p.m. Kerosene is used as fuel, a special carbureter being fitted. Ignition is by K-W magneto with impulse starter. The transmission gives three forward speeds—1¼, 1½ and 5 m.p.h.—the intermediate speed being a direct drive and the one intended for plowing. All gears in the transmission are of 3½ per cent nickel steel and the shafts are mounted on Timken bearings. The track is 11 in. wide and gives a contact area of 1650 sq. in., so that with a total weight of 6500 lb. the unit pressure is from 3 to 4½ lb. per sq. in. Provisions are made for bolting wooden extensions to the track and thus reduce the pressure per square inch. A 10-in. diameter by 8-in. face belt pulley is mounted at the forward end of the tractor, with its axis transverse to the frame, so that the belt can be conveniently tightened. The frame for the tracks is semi-rigid and there are no spring supports between the track and main frame. Channel section rolled steel forms are used to support the sprockets and truck rollers and are joined at the front and rear by axles. These will twist a certain amount and thus provide some flexibility.

The Prairie Dog

FOR several years the Kansas City Hay Press and Tractor Co. has been showing a tractor of rather unusual appearance known as the Prairie Dog. This year it exhibited a new model which is more in line with modern ideas of tractor design, but which will be known by the name Prairie Dog. Distinction between the old and the new model is by calling the former Model L and the latter Model D. The engine of Model D is a Waukesha 4½ x 6¼ in., designed to burn kerosene. It is equipped with a Bennett air cleaner, Bennett kerosene carbureter and Dixie magneto. The transmission has a one-piece housing bolted directly to the engine bell-housing, thus forming a unit power plant. Two forward gear reductions are obtained, corresponding to 2¾ and 3¾ m.p.h. at 900 r.p.m. of the engine. Final drive is by internal gears at the wheels, which gears are fully enclosed. The



Franklin crawler type tractor

rear axle, which is stationary, is bolted direct to the transmission case. It consists of a hollow spindle 5 in. in diameter and steel-bushed, and lubrication is effected from the oil supply in the bull gear cases. The belt pulley drive is carried through the hollow spindle of the rear axle and permits a detachable pulley to be mounted on the outside of the tractor wheel, so the belt can be run either forward or backward. The pulley has the unusual diameter of 20 in. and runs at only 350 r.p.m. The front axle is of the built-up type, with automobile type steering knuckles and 32 x 5-in. wheels running on ball bearings. The drawbar is of the swinging link type, pivoted centrally at the front of the rear axle; it can be adjusted vertically 5 in. and horizontally 18 in. The machine has a wheelbase of 75 in. and weighs 4500 lb. One of the items of equipment is a Sylphon regulator which is said to be a great aid in burning kerosene successfully.

Franklin

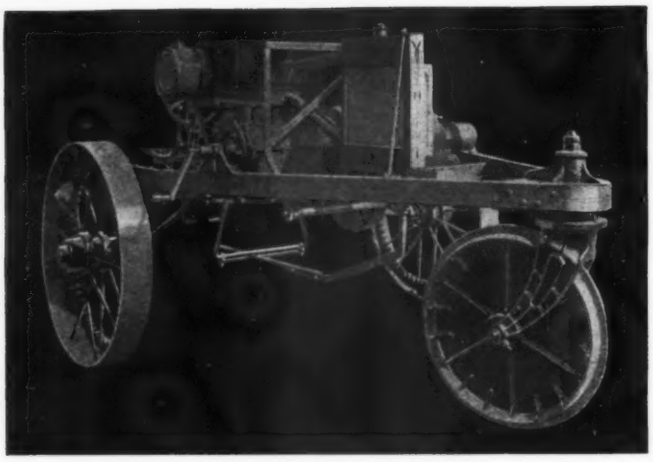
THE Franklin, a crawler type machine, is fitted with a Buda four-cylinder 4¼ by 5½ in. engine, rated 30 hp. at 1000 r.p.m. The drive is through independent clutches. The tracks are 8 in. wide and have a traction length of 50 in., giving an area of 400 sq. in. The tractor is 86 in. long, 52 in. wide and 52 in. high. The frame is built up of channels and angles. Three speeds are provided, 2, 3 and 4 m.p.h., with a reverse speed of 1¼ m.p.h. The belt pulley is 10 in. in diameter and gives a belt speed of 2610 r.p.m.

Other features of the power plant include a Bennett combination kerosene and gasoline carbureter, centrifugal governor and a Dixie high-tension magneto, with impulse starter. Cooling is by means of a long tubular radiator and centrifugal pump. The fuel tank is above the engine.

New Departure bearings are used in the drive system and the transmission. The steering wheel is of large diameter and mounted on a vertical column. A feature of this tractor is the mounting of the seat on six coiled springs. The weight of the complete machine is given as 3500 lb. The tractor is made by the Franklin Tractor.

Rock Island Motor Cultivator

THE Rock Island Plow Co., manufacturer of the Heider friction driven tractors, has added a motor cultivator. The new machine has a distinct feature in that the operator need watch only the gangs, and the front wheels of the cultivator will automatically follow the furrow. This is done by connecting the gang mechanism control with



Parrett motor cultivator

the steering gear. The control is effected either by the steering wheel or by two pedals.

The machine is powered with a LeRoi engine, 3⅛ by 4½ in. and has the well-known Heider friction transmission, with final drive to the rear wheels by spur gears. Hyatt roller and U. S. ball bearings are used throughout the machine. Although it is making its initial appearance at the show this cultivator has been in use for about 2 years as an experimental proposition.

Parrett Motor Cultivator

THE Parrett motor cultivator is a two-plow machine suited for all around farm work such as pulling hay loaders, planters, disk harrows, operating feed grinders, wood saws, etc., in addition to its primary purpose of cultivating corn, cotton, tobacco and other row crops. The tread and wheelbase are so proportioned that in turning at the end of the field no corn will be run over.

The frame is channel steel, heavily gussetted and hot riveted. At the front a large semi-steel casting forms the steering gear retainer and front axle pivot. The front axle is of the yoke pattern, with 30-in. wheels. The rear wheels are 44-in. in diameter, with cast iron hub on Hyatt roller bearings. Large radius rods on the rear axle permit of adjusting the mesh of the drive gears. Replacement costs have been reduced by making the internal drive gears on the rear wheels in segments, bolted to the driving angle irons.

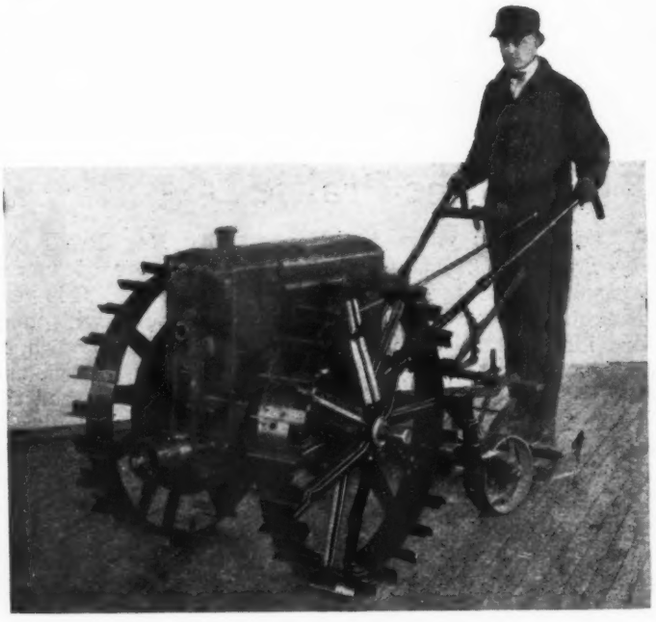
The engine is a four-cylinder LeRoi, 3⅛ by 4½-in., with Eisemann high-tension magneto and Kingston carbureter with air washer. It is three-point suspended and the bottom is accessible for bearing work. The engine is placed crosswise. The transmission is a sliding gear, furnishing a low speed of ⅞ to 1.3 m.p.h. and a high speed of 2.75 to 3.6 m.p.h. The belt pulley is arranged so the machine can be backed into the belt. The machine is made by the Parrett Motors Corp.

The E. B. Cultivator

THE Emerson-Brantingham Co. exhibited a motor cultivator which is intended as a general purpose machine, being suitable for almost any kind of farm work except plowing. The only thing that makes it unsuitable for plowing is its wide tread, which would cause an excessive side draft. This machine is equipped with a LeRoi four-cylinder engine which drives through a friction wheel and a pair of disks, one disk serving for the forward drive and the other for the reverse and power take-off. From the shaft of the friction disk the power is transmitted by a pair of spur gears, located in line with the engine crankshaft, to the differential jackshafts, thence by roller chains to two short shafts above the axle and finally by spur gears to the rear wheels. The driving wheels are 44-in. in diameter by 6-in. in width and can be fitted with 3-in extensions when desired to reduce soil packing. The steering wheel in front is 28-in. in diameter. Steering is effected by means of a hand wheel acting on the front wheel and by applying a brake to one of the driving wheels. One of the interesting features of this cultivator is that its track can be varied within a range of 14-in. Gasoline is the fuel used and ignition is by magneto.

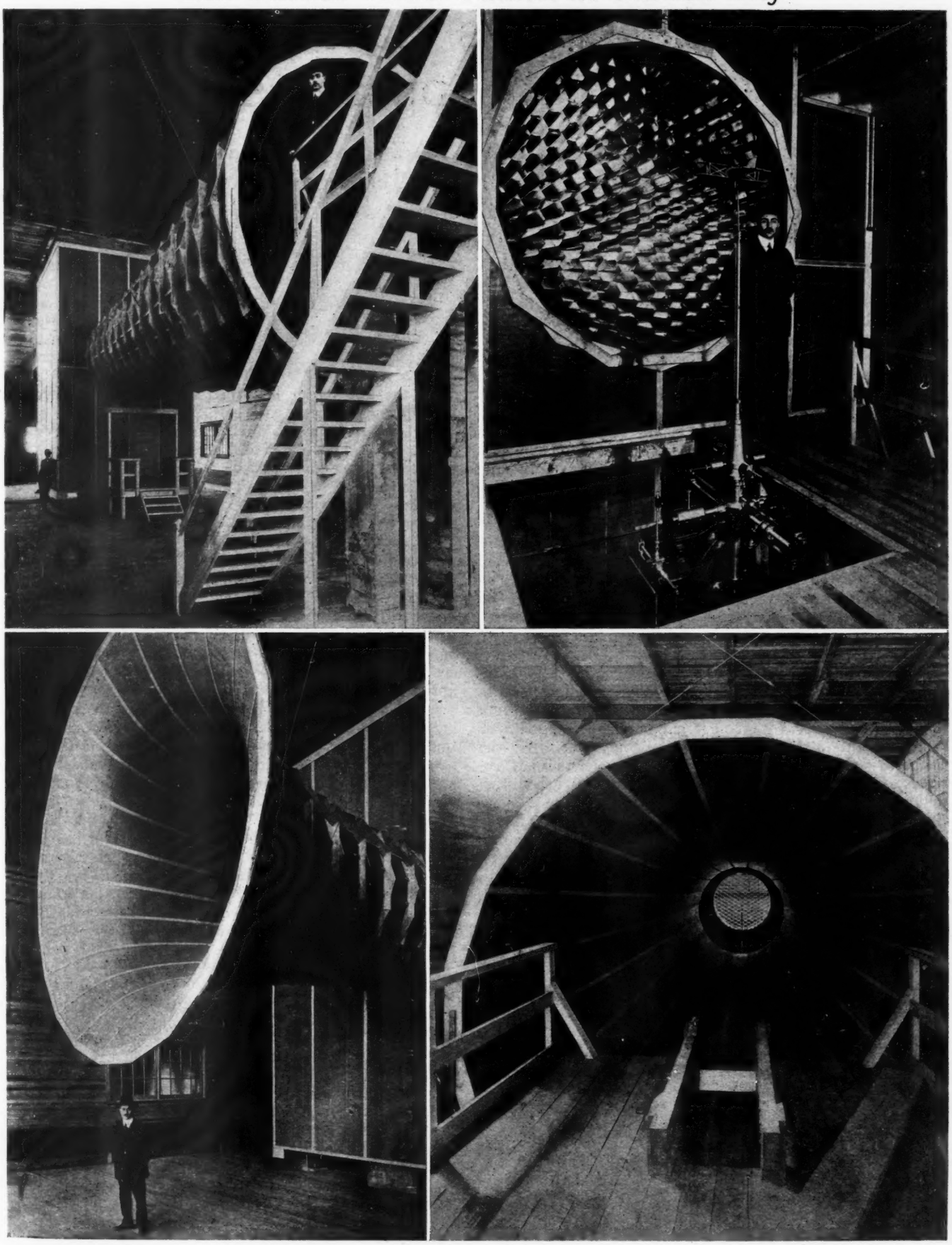
Considerable work has been done in garden tractors the past year and at the show this type was represented by four makes, the Beeman (the pioneers in this field) the Utilitor, the Oldsmar and the New Britain. These are single-cylinder machines with two traction wheels about 24 in. in diameter, the operator walking behind and guiding the tractor by means of handles. The Utilitor, which is representative of this type, has a single-cylinder 3½ x 4½-in. engine running normally at 1200 r.p.m. With traction wheels 24¾-in. in diameter and a reduction ratio of 35:1 the tractor moves at about 2½ m.p.h. The Oldsmar is the design of R. E. Olds of the Reo Motor Car Co. This machine has a large engine of the slow speed type, the cylinder dimensions being 5x 5½-in. and the engine speed 580 r.p.m. This engine is arranged horizontally and air cooled, there being a fan at the side of the cylinder which blows cool air over the cylinder wall. The tractor is geared to 2½ m.p.h. and weighs approximately 1000 lb., practically all of the weight being over the driving wheels. These drive wheels are 32 in. in diameter and have 4½-in. rims. Each drive wheel has a positive clutch and in turning a corner the inside wheel is disconnected from the drive and the tractor turns around it as a pivot. In addition to the drive wheels there are two rear non-driving wheels which carry the operator's seat. From 3 to 5 hp. can be developed on the belt pulley.

THE area sown to fall wheat in Canada for the harvest of 1920 is estimated at 776,400 acres, compared with 714,700 acres last year, according to an Ottawa announcement.



New Britain garden tractor

The Curtiss Wind Tunnel at Garden City



The upper views of this airplane test mechanism show (left) looking towards the front and (right) model ready for experiment. Below—(left) collector end and (right) diffuser end

Ohmer Line Shows Latest Practice in Ignition Apparatus

Several magneto designs as well as a generator-magneto and a generator-ignition combination make up the line. The magnetos show several departures from old design. More aluminum used in construction.

IN conformity with latest practice, a complete line of ignition apparatus has appeared in which the pole pieces are integral with end plates of aluminum, made by the die-casting process. During the week of the New York show, this apparatus, made by the Recording & Computing Machine Co. and known as the Ohmer, was shown privately at the Waldorf-Astoria Hotel.

In the "AX" type of magneto, which is for either 4 or 6 cylinder engines, two U-shaped magnets are used. They are secured to the housing by means of four screws between the two magnets. There is the usual type of armature, with both primary and secondary windings, and the condenser is located between the armature and the interrupter. An elliptical type of cam operates the interrupter, the latter being overbalanced so that the centrifugal force on its arm tends to aid the spring in keeping the breaker points in contact at high speed. A fiber cam follower is fitted to the ends of the interrupter arm. The interrupter arm is reversible and the magneto can be used either for clockwise or counter-clockwise rotation, the only change needed being to reverse the arm on its shaft.

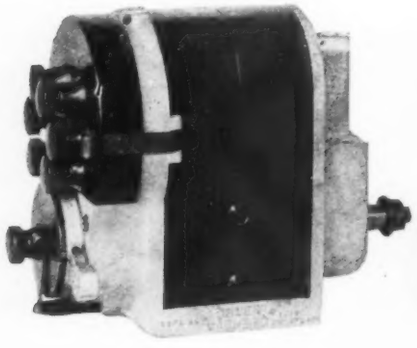
Another interesting feature of construction is the reversible bushing on the distributor shaft, which permits use of the same distributor gear, rotor and housing for a 6-cylinder and for a 4-cylinder magneto. In a 6-cylinder magneto the distributor rotates at only one-third the armature speed, whereas in a 4-cylinder magneto it rotates at one-half armature speed. Consequently, a different pinion has to be used on a 6-cylinder than on a 4-cylinder magneto. The larger pinion for the 4-cylinder magneto makes it necessary to increase the center distance between the distributor and interrupter shafts. This is accomplished by the reversible eccentric bushing.

The safety gap is located in the center of the arch of the magnets, the insulated terminal of the gap being directly connected to the carbon holder. This being of angle form, it holds the carbons for both the slip ring and the distributor rotor.

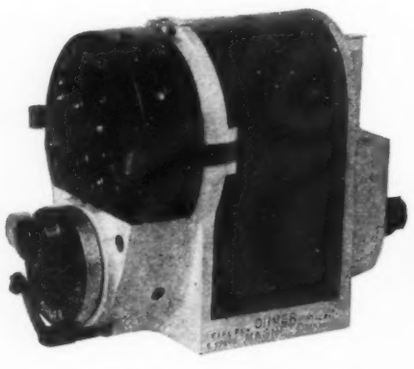
A new synthetic compound known as Formica is used for the distributor gears, which is said to be absolutely noiseless in operation and, since it is an electric insulator, it protects the distributor rotor from burning out. A timing range of 35 deg. is obtainable with this model. Both the distributor head and the interrupter cover are held down by spring catches.

A two-spark magneto is made, known as Type BX, which has a housing of exactly the same pattern as the single-spark magneto just described, except that it is one inch longer at the rear end. The special feature of this model is that two separate slip rings are used, one at the driving end and the other at the interrupter end. This obviates any possibility of a short-circuit being formed between the two rings by carbon dust, etc. The distributor of this model is of the usual end-on type, but it has two circles of contact sectors, the outer one set about ½ in. back from the other. The distributor brushes for the two sets of contact segments are located opposite each other. The two-spark magneto has all cable connections on the inside of the distributor cover and is absolutely waterproof.

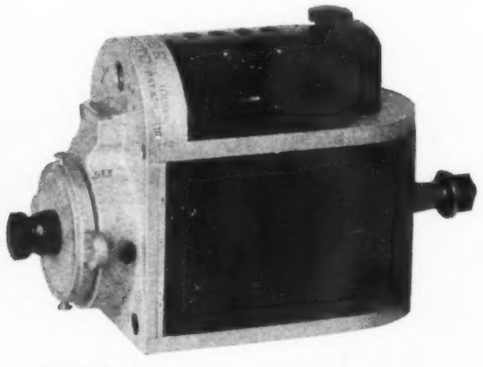
The latest type of magneto made by the concern has its magnets laid on the side, and the armature shaft extending up the arch of the magneto and through a hole in the magnets at the center of the arch. This model, known as type CX, is made in 4, 6 and 8 cylinder models, and also as a two-spark machine. The same size of magnets is used in this model as in the other two, but they are not drilled for securing them to the laminated pole pieces. They are drilled from the ends, however, and are held in position by six screws, of which one also serves as a stud carrying the interrupter cover spring. In this model the condenser is located between the armature and the slip ring, or at the driving end of the armature, the reason



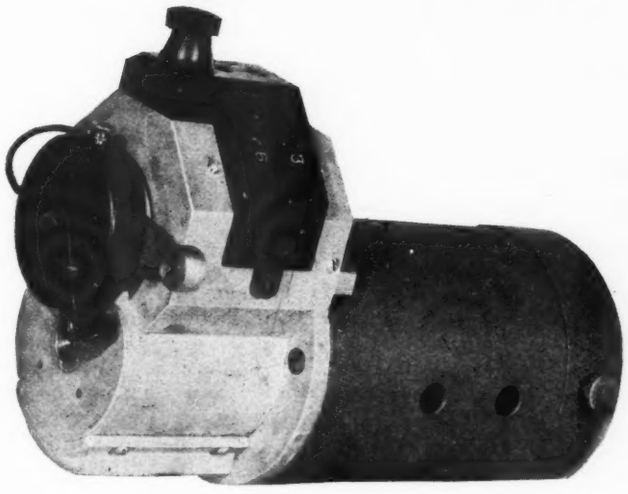
Type A Ohmer magneto for 4 or 6-cylinder engines

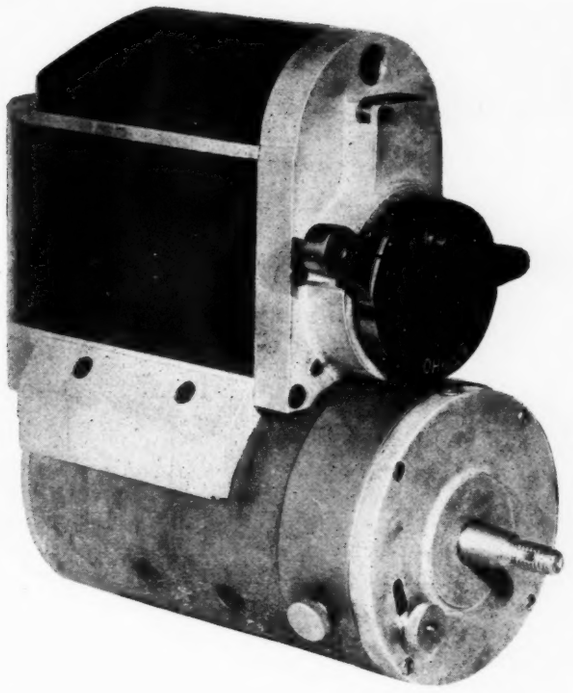


The Ohmer two-spark type B magneto



Distributor is at top and magnets edgewise in type C





Above—Ohmer generator-ignition unit
To the right—Ohmer magneto-generator combination

for this being that there is plenty of room for this purpose within the arch of the magnets. Overlapping laminated pole shoes are used, and this permits of a timing range of 55 deg. The high-tension leads from the armature are taken right through the condenser to the slip ring. With this model a drum form of distributor rotor is used, of small diameter and considerable length, and the distributor is compactly mounted on top of the magnets. All cable outlets are arranged in a straight line on top, the connection being on the inside of the housing, making the machine waterproof.

For convenience in setting and timing the magneto, there is a sight hole at the distributor end, and a figure one is marked on the distributor gear. When this figure is directly behind the sight hole, the interrupter is at the point of break, and the high-tension winding is connected through the distributor to the spark plug of No. 1 cylinder. Both the main parts of the distributor, the housing and the rotor, are made of condensite, while the slip ring base is made of hard rubber.

This magneto can also be used both for right-hand and left-hand rotation, all the changes necessary when the direction of rotation is to be reversed being to start connections from the distributor at the opposite end. Both the distributor and armature shaft are lubricated through a single hole provided with a snap cover, a tube being cast into the housing, which conducts the oil to the bearing surfaces.

The generator is of the cylindrical type, with four poles and two main collecting brushes. Regulation of output is by the third brush system, the third or field brush being located opposite the two main brushes on the commutator. Means are provided on the outside of the generator for adjusting the position of the regulating brush, and thus of changing the output characteristics of the machine. The machine is wound for 6 volts, and gives an output of 10 amperes.

Taking account of the almost universal use of electric generators of passenger cars, the company has developed a combination generator and magneto. This magneto, the same as the type CX, has its magnets arranged horizontally. This magneto, to, has a housing die cast of aluminum, the base of which is concaved so as to fit the cylindrical contour of the generator. This base of nonmagnetic material at the same time forms a shield preventing leakage of magnetism from the poles of the magnet to the generator frame. The generator is designed to be driven at camshaft speed, and a 6-cylinder magneto therefore has its armature geared up in the ratio of 3 to 1 from the generator armature, while a 4-cylinder magneto is geared up 2 to 1. In the magneto models the horizontal magnet and safety gap is located directly over the slip ring.

The entire housing is die cast, the end plate at the distributor end being separate die casting.

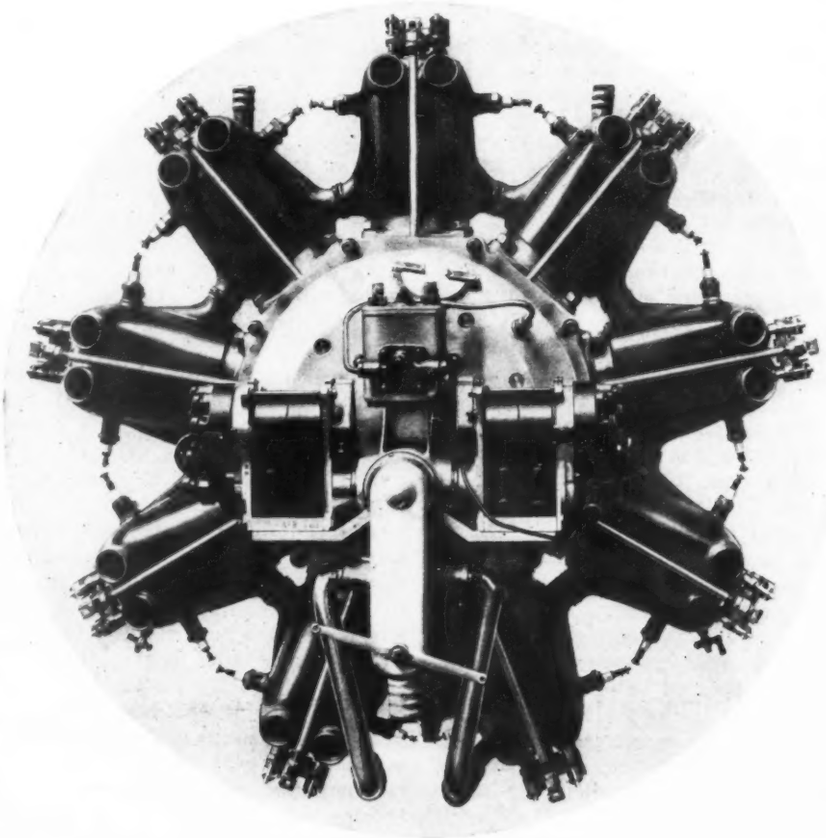
A battery ignition system has also been developed for combination with the generator. In this, the distributor and interrupter are both mounted on the same shaft. The interrupter is operated by a multiple point cam, and is located outside the die cast housing containing the distributor. It has the same type of cover, held on by a spring, as is found on the magneto, and is therefore readily accessible. The distributor is in the form of three slip rings, one ring serving for carrying the high-tension current into the distributor, and the other for distributing it to the respective cylinders. These distributor rings are provided with metallic sectors only, instead of complete rings. This battery ignition unit can be made up to give either a plain battery system, or can be combined with a magneto, in which case the magneto is also mounted on top of the generator. In the combined system, the same distributor serves for distributing magneto and battery sparks, but each system has its own interrupter. The coil furnished with this battery system is of the same construction as the magneto armature and will stand the same electric pressure. The condenser is located in the metallic housing containing the distributor gear, and is therefore very close to the interrupter, necessitating only short connections.

STATISTICS of motor cars, trucks, etc., imported into Norway during September last and expressed in terms of cash, read as follows: From the U. S. A., 4,386,000 kroner; from Germany, 241,000 kroner; from France, 200,000 kroner; from Great Britain, 150,000 kroner; from Italy, 79,000 kroner.

European Aircraft Trend Is Toward Large Water-Cooled Engines

Power units with fixed cylinders, numbering more than six, were predominant at the Paris aeronautical exhibition. The four-valve type likewise was featured. This article is a detailed description of the various engines viewed from the critical standpoint of future development.

IT cannot be maintained that the aeronautical exhibition in the Grand Palais, the handsome show building of Paris, was commercially of tremendous importance. The day has not yet arrived when airplanes are sold to the masses and the manufacturers responsible for the Paris showing doubtless did not expect to be kept busy booking orders. As an educational display, the value of the show cannot be over-rated. It contained every machine of historic interest, from the early Farmans, Voisins, Antoinettes and Blerios, to the big bombers of yesterday and the aerial liners of tomorrow. Aerial ground stations were shown in models and by means of drawings, scientific instruments were found in plenty, the medical aspect of flying was given full attention, and all of the accessories of flying, including the automobile services that must go with it, were to be found in this wonderful hall. To round off the effort, lectures were given by recognized authorities on a great many features of aerial navigation.



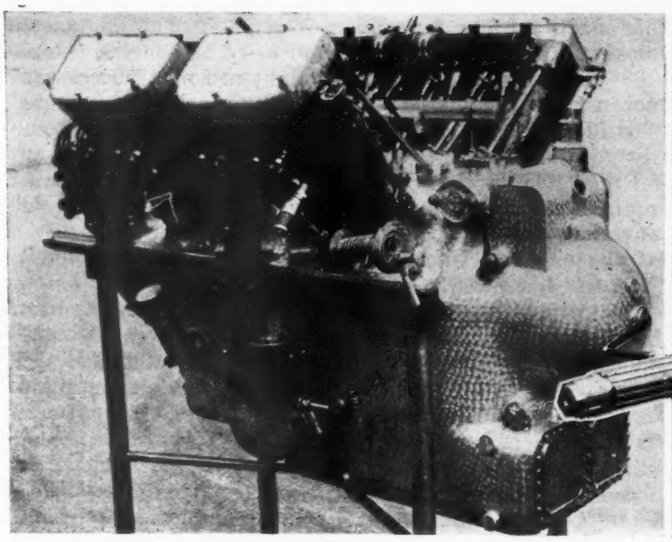
The new Fiat 9-cylinder 300-hp. star type engine. The cylinders are steel with welded-on jackets. The two exhaust ports are shown, the intake ports being on the opposite side of the engine. All intake pipes are inside the water jackets

A close examination of the exhibits indicated that the coming aviation engine will be of the fixed cylinder water-cooled type with a greater number of cylinders than six. This does not necessarily imply that the air-cooled engine is dead but, as power in a single unit is rising, the advantage is more and more with the water-cooled type. Single engines are being built with 600 to 1200 hp. and, when this high power is required, the fixed cylinder water-cooled type only can be considered. On the other hand, there is a certain revival of small aviation engines, developing from 30 to 60 hp., all of the air-cooled type, some having only two cylinders placed horizontally.

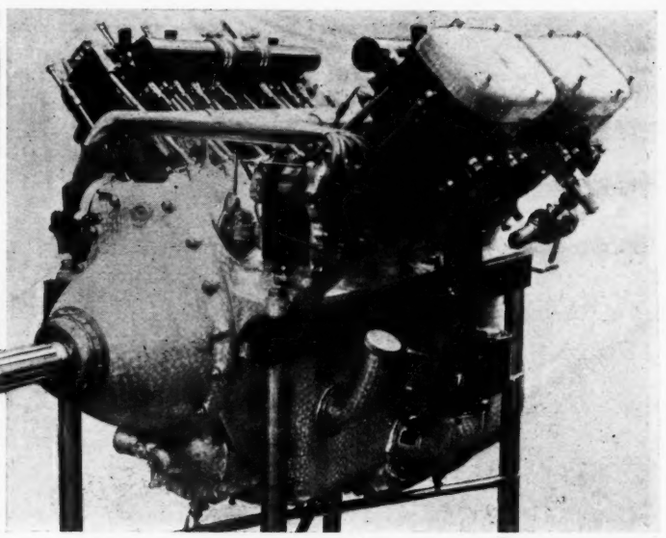
The four-valve engine is a prominent feature, having almost completely ousted the two-valve type; there is reason to believe that for large bores the number of valves will increase. Sunbeam already is building an engine with three inlet and three exhaust valves per cylinder. The valves are operated by pushrods and rockers, a system that is gaining ground over the overhead camshaft. One pushrod is made to operate all the valves of one type in each cylinder. Thus in the Sunbeam a single pushrod operates three intakes and another pushrod commands three exhausts.

The war has killed all freak engines. There was not a single one in the Paris show that cannot, without difficulty, be entered into one of the three following classes: fixed, multi-cylinder water-cooled automobile type; rotary air-cooled, and star engine with fixed, water-cooled, but sometimes air-cooled, cylinders.

Engines with geared down propellers are on the increase. As a consequence, piston speed is being increased and higher efficiency is being obtained. At present, piston speed is not high compared with automobile racing practice. The most advanced aviation engines are limited to 2500 r.p.m., giving a piston speed of a little



Farman 200-hp. 8-cylinder engine with reducing gear



Farman 200-hp. 8-cylinder engine with enclosed electric starter and starting magneto

more than 40 ft. per second compared with 70 ft. for racing practice. During the war, engineers were not encouraged to increase engine speed, most of those in authority being prejudiced against and afraid of high-speed engines. Many of the earlier engines, too, developed trouble with reducing gears and such defects could not be eliminated owing to lack of time.

The largest engine in the show was the Lorraine-Dietrich 24-cylinder W-type. It has separately forged steel cylinders of 126 x 200 mm., with a sheet steel water jacket common to a pair of cylinders. The four valves are in the head but are operated from a crankcase camshaft and push rods. The engine is of a direct propeller type. It was designed toward the end of the war for use on the big 1919 bombers which were rendered unnecessary by the armistice, but is being produced for commercial purposes.

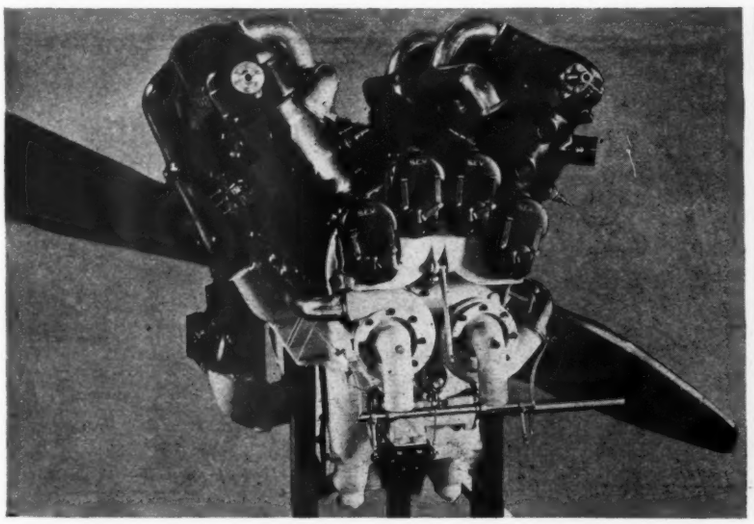
Fiat has a good example of accessibility on the new 12-cylinder 400 hp. geared down type. The cylinders are steel forgings with four valves in the head, but there is a common water jacket for each line of six. The exhausts are on the outside, as are also the carbureters and the magnetos.

Drive for the overhead camshafts is taken from the center, but the inclined shaft, which is in two parts and telescopic to allow for elongation, is inside the cylinder blocks, between the third and fourth cylinders. A central cross shaft drives the two centrally located magnetos, which are mounted on the center of the aluminum crankcase, with their distributers outward. The two carbureters are bolted up direct to the cylinder blocks, for the intake pipes are welded in position inside the water jackets and lead the mixture to the inside of the angle of the cylinders, where an external manifold distributes it to the different valve ports.

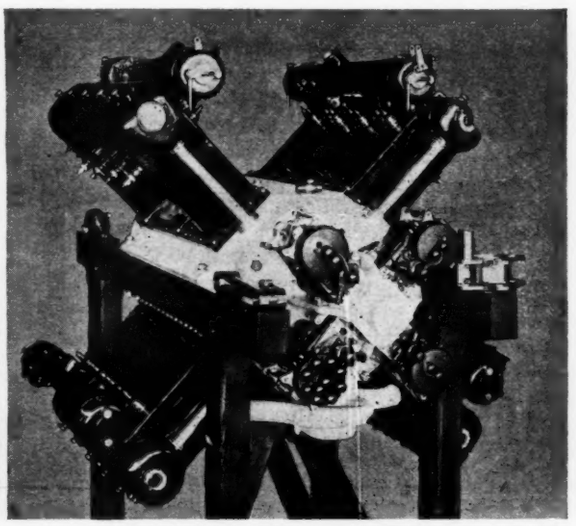
The normal engine speed runs up to 2300 r.p.m., with a maximum of 2500, the propeller being kept down to 1500 r.p.m. by herringbone reducing gears with a ratio of 1 to 1.51. This engine has four valves per cylinder and two spark plugs per cylinder fired from two magnetos.

The weight empty is 804 lb. and, with water and radiator, 903 lb. The average gasoline consumption is 220 grammes per horsepower hour.

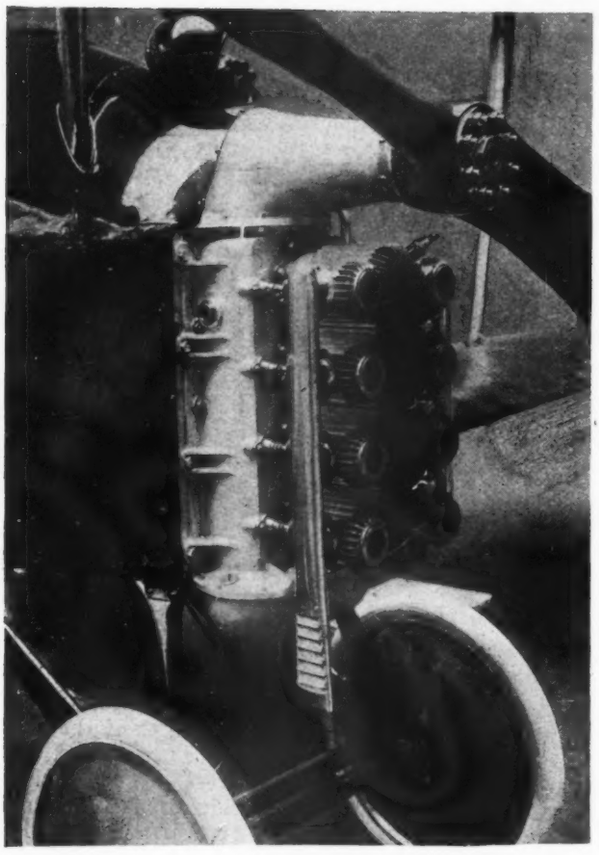
As an indication of the tendency in Europe, it will be noticed with interest that Fiat has adopted the water-cooled star-type for the new 300 hp. engine. The nine cylinders, measuring 130 x 150 mm., are steel forgings



Rear view of the 12-cylinder 600-hp. Peugeot engine



Peugeot X type 16-cylinder aviation engine



Exhaust side of Potez engine. This engine is mounted vertically and drives propeller through reducing gears

with sheet steel welded-on jackets, mounted around a circular aluminum crankcase. One of the features of this engine is the ingenious manner in which all the intake pipes are put inside. The carbureter is bolted direct to the lowest portion of the front of the crankcase and delivers its mixture to a distributing chamber cast with the case. The intake pipes are steel tubes welded in position when the cylinders are built up and before the sheet steel water jacket is put on. With this arrangement, the intake pipes are entirely inside the water space and the mixture is uniformly heated on the whole of its passage from the carbureter to the valves.

There are four valves per cylinder, mounted vertically in the head and operated by a single pushrod and rocker arm. Laminated springs are used with a very large number of thin leaves. A bridge piece unites two similar valves, the two ends of the rocker operating them.

All the accessories are mounted on the rear face of the crankcase. These comprise two magnetos, placed transversely, an external oil pump immediately above these, and the water pump below the oil pump. Lubrication is under pressure throughout. Weight of the engine empty is 500 lb. With radiator and water, the weight is 628 lb., giving a weight per horsepower of 2.09 lb.

Farman V Type Engine

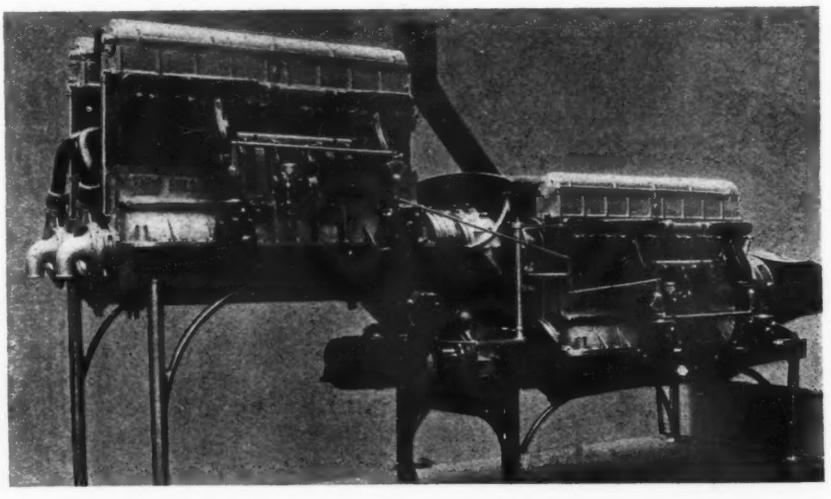
Henry Farman, as the largest airplant manufacturer in France, has brought out his own aviation engine and has fixed on the 8-cylinder, V-type of 200 hp. as the most suitable for general service. This engine weighs 700 lb., but included in this weight are many accessories not usually considered when engine weight is quoted. The idea prevalent with the Farman engineers was security for long distance work under varied conditions and on this account they have built in with the engine much equipment frequently added only as an afterthought. As an example, the Ragonet electric starter is an integral part of the engine. In addition there is a magneto impulse starter. Ignition is by high-tension magneto but, having a motor-generator for starting purposes, dual ignition has been fitted. Added to this engine, although its utility appears doubtful in view of the presence of the electric apparatus, is a cartridge starter. This has been designed by Farman for application to any kind of internal combustion engine. An unusually heavy supply of oil is contained in the base chamber and provision is made for either heating or cooling this, according to conditions. There is an oil thermometer and also a water thermometer. Valve operation is by camshaft in the base chamber, pushrods and overhead rockers, the latter being enclosed by aluminum covers and fed direct with oil. The reducing gear on this engine is of the bevel type, on the same lines as an automobile differential. There is one fixed crown bevel, a differential spider with four satellites and the driving crown bevel wheel.

Two New Peugeot Models

Two entirely new engines figured on the Peugeot stand. The larger has 12 cylinders at 60 deg., with four valves in the head. Cylinder construction is on Hispano-Suiza lines, with an aluminum block and steel liners.

This general construction has not made much progress, for with the exception of the Peugeot, it is employed only by the Hispano-Suiza company. The preference is for steel cylinders with welded jackets. The Peugeot, which develops 600 hp. at 1600 r.p.m., has an overhead camshaft with rockers interposed between the cams and the valves. The exhaust is on the outside, in accordance with present requirements, and the carbureters are also on the outer side, with air intake through the crankcase. As the intake manifolds are within the V, the mixture is led through the center of the housing enclosing the valve-operating mechanism. There are four magnetos, each one firing six plugs and two water pumps.

The second Peugeot is an entirely different type and is the product of Engineer Jouffret. Sixteen cylinders, in four groups of four, form an X and have rods connecting



Bugatto quadri engine group. The 32 cylinders drive a single shaft and a single propeller

up to a four-throw, three-bearing crankshaft. This is the only X type engine in the show; the idea, however, is not entirely new, having been adopted by Gobron and others in the early days of flying.

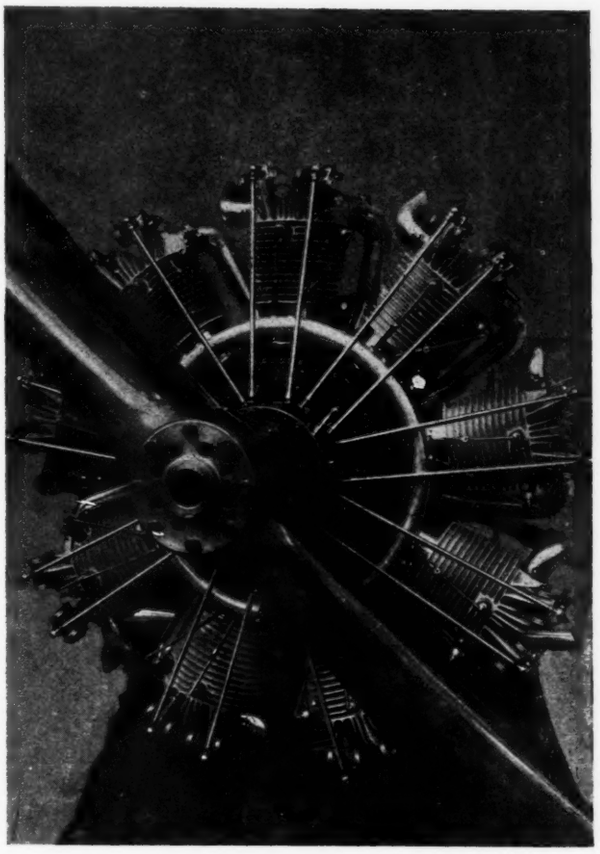
In this construction, the cylinders are steel forgings, each group of four being welded to a base plate, and a sheet aluminum water jacket fitted round the group. The heads, which are cast iron and welded in position, also serve to unite the four. There are four valves per cylinder, slightly inclined in the head and operated by an enclosed overhead camshaft, with a single rocker arm for each pair of valves. Cylinder dimensions are 130 x 170 mm. and the power developed is 500 at 1400 r.p.m.

This engine has a center crankshaft ball bearing and plain bearings for the ends. The tubular connecting rod consists of one master rod, mounted direct on the crankpin, and three auxiliary rods, one being in the prolongation of the master, and the two others at 180 deg. to it. Camshaft drive is by bevel gearing and an enclosed vertical shaft for each group of four cylinders. From the camshaft drive gear the magnetos are operated, there being one for each group of four cylinders. The water pump, mounted immediately below the magnetos, is common to the entire engine.

One of the features is the system of intake manifolding. Running along one side of the cylinder block, near the head, is a concentric chamber forming a combined water collector and intake manifold. The outer portion of the tube collects the cooling water from the four cylinders and discharges it at a central point to the radiator. The inner portion is thus heated uniformly throughout its length. This intake manifold really forms a mixing chamber, having two jets, one an idler and the other high speed, at each end. There is an air inlet with throttle at each end. The carbureter, which is common to the entire engine, consists of nothing more than a float chamber. A rich mixture is fed into each end of the intake manifold and is diluted at this point. The practical result is two carbureters for four cylinders and uniform heating of the mixture that assures each cylinder receiving a correct mixture at all engine speeds.

Sixteen Cylinder Panhard

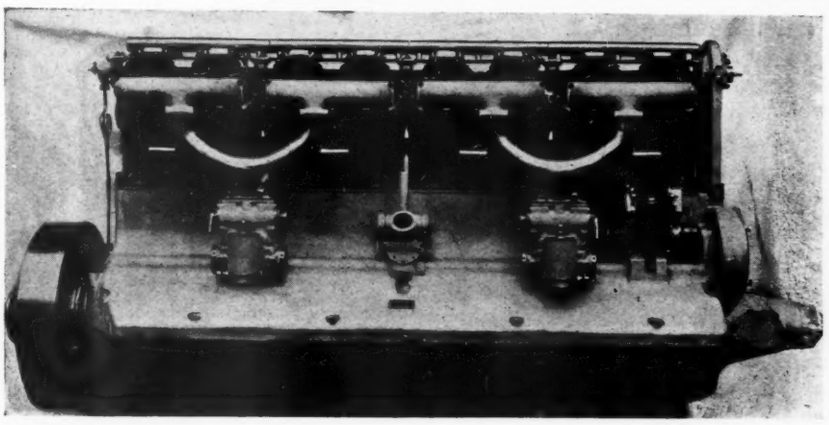
A 16-cylinder engine was also exhibited by Panhard-Levassor, the arrangement being distinct from that of the Peugeot. It has four rows of cylinders, mounted on an aluminum crankcase, with a small angle between them. Each cylinder is a separate steel forging, with sheet steel jacket, and four vertical valves in the head of each, operated by two pushrods, for the two camshafts are in the crankcase. Each rocker arm is a double fork type, with a roller between the two branches of the fork on the outer end and a ball on the opposite end. The roller is in contact with the hardened circular portion of a bridge piece connected to a pair of valves and the ball receives the socket at the upper end of the pushrod.



The latest Salmson 9-cylinder star type air-cooled engine. It has steel cylinders with aluminum jackets

There is a carbureter for each group of four cylinders, with a common float chamber for each two groups. The carbureters are located at the rear of the engine and the two intake manifolds run parallel in front of the cylinders, there being four branches to the individual cylinders. Two of the magnetos are at the rear of the engine and two are at the propeller end, both being mounted crosswise.

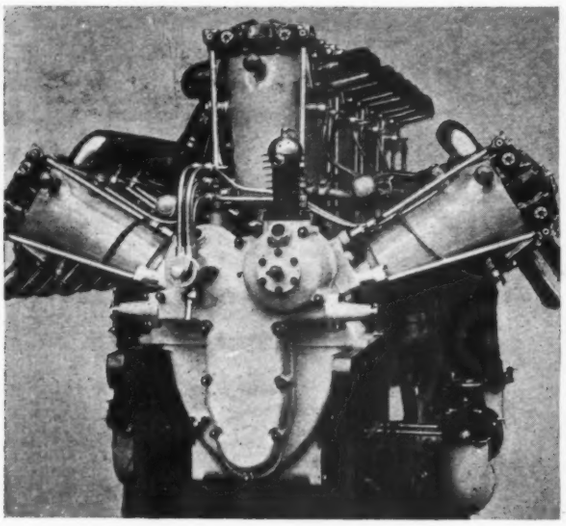
This engine has cylinders measuring 145 x 170 mm.; it develops 720 hp. and weighs 1158 lb. Panhard has two other engines, one being a 12 V-type, with separate steel cylinders and geared down propeller; the other is of the same general design, but with direct-driven propeller. The former measures 115 x 170 mm.; it weighs 1270 lb. and develops 340 hp. The second is a larger engine of 165 x 180 mm., developing 500 hp.



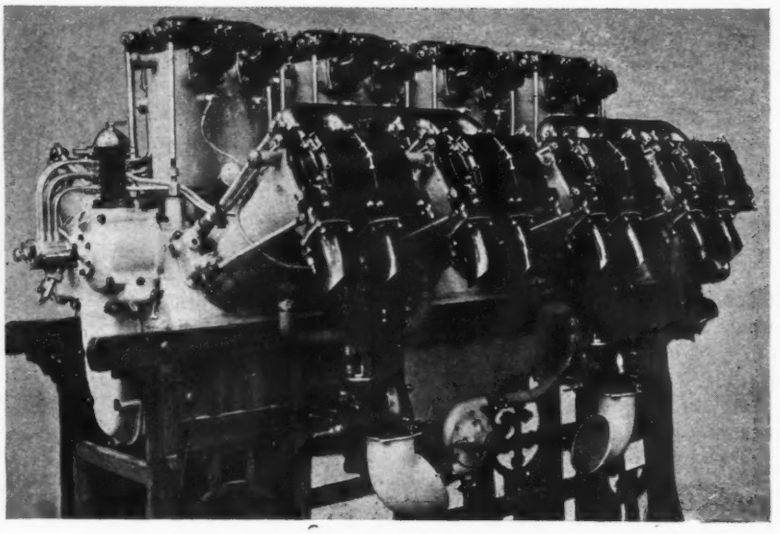
Clement-Bayard 8-cylinder overhead valve airship engine

Details of Lorraine-Dietrich 24

Lorraine-Dietrich exhibited the biggest airplane engine in the show, a 24-cylinder, water-cooled W-type with cylinders of 126 x 200 mm. This is the latest production of the Lorraine factory and in many respects is different from the design followed during the war. As for all the others, steel cylinders are used with four valves in the head, but the operation is from a crankcase camshaft and a pushrod for each pair of valves. All the valve mech-



End view of Lorraine-Dietrich 24-cylinder 1000-hp. engine



Lorraine-Dietrich 24-cylinder 1000-hp. engine

anism is enclosed. The crankshaft of this engine is a wonderfully fine piece of work and consists of four sets of throws at 180 deg. and five bearings. The shaft is hollow throughout its length. There is a master connecting rod, bolted direct to the crankpin and two lateral rods mounted on the top of the main rod. These lateral rods are secured on the main rod by double split rings, each one of which is in two parts. These four half rings are placed with their divisions at 180 deg. and are united by a series of bolts into a complete outer bronze-lined bearing.

Clerget 16-hp. twin-cylinder aviation engine

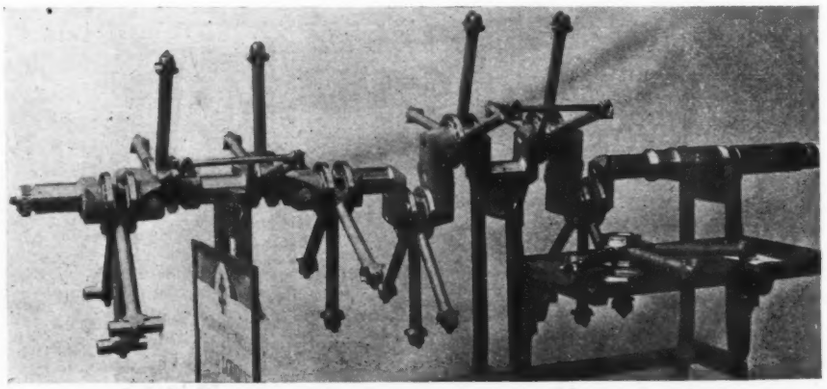
Although a W engine, the carbureters are all placed on the outside. On one side there are two dual carbureters feeding eight cylinders. On the opposite side the carbureters are quadruple, four feeding an outer group and the mixture from the four others passing between the outer cylinders to the center line. The exhausts are on the outside, with the exception of the center group. This engine relies on Delco only for its ignition. The abandonment of the magneto, however, is not new on Lorraine-Dietrich productions, for many of the engines supplied by this firm to the army had Delco only.

While the majority of makers favor four valves per cylinder, only one makes use of a greater number. On a 12-cylinder Sunbeam, of 800 hp., there are three intakes and three exhausts mounted in the head and operated by a single pushrod for each set of three. This makes an interesting engine.

So far as Continental makers are concerned, there has been considerably less development in air-cooled engines than in the water-cooled variety. Gnome, Clerget and Anzani have remained true to the air variety and have adopted improvements. There appears to be a demand for small engines for single seater runabouts and here, of course, the air-cooled engine is supreme. One of the smallest is a twin-cylinder horizontal built by Clerget.

The cylinders, which are only 85 x 100 mm., are steel forgings with machined fins and valves in the head operated by pushrods and rockers. It is stated to develop 16 hp. It has roller bearings for both the crankshaft and the connecting rods, aluminum alloy pistons, and forced lubrication. The weight is only 48½ lb.

Another small engine is the Poetz, which, incidentally, is the only T-head type in the show. The separate steel cylinders are fitted with aluminum finned jackets, the whole being mounted on an aluminum crankcase, as in the usual automobile practice. The engine is placed on end, the enlarged timing gear housing forming the oil tank, and is mounted immediately behind the propeller, which is driven by bevel reducing gears. The arrangement gives a low center of gravity and, being directly in the propeller slip, cooling should give no trouble. For such small powers, this engine not developing more than 40 hp., the arrangement has advantages.



Crankshafts and connecting rods of the Lorraine-Dietrich V-type 1000-hp. engine

There is another arrangement of steel cylinders and attached aluminum fins on the new 9-cylinder star-type Salmson. In all general respects this engine is similar to the water-cooled variety built for many years by this firm. The only difference of any importance is that, instead of a water jacket, radiating fins are added.

Gnome has a new low-powered machine, the Z-9, rated at 60 hp., with cylinders of 84 x 106 mm. The valve in the piston head has given way to a mechanically operated valve in the cylinder head. The internal lock ring holding the cylinders to the crankcase is replaced by studs and nuts. The crankshaft is hollow but this is used only to cool the internal parts of the engine. The carbureter delivers its mixture to the intake valves by external intake pipes.

The Seja, while a rotary air-cooled type, has distinctive features. The connecting rods are rigidly connected to the aluminum pistons, without the use of a wrist pin. The cylinders, however, can oscillate, for they are hung in trunnions, near their head, between a couple of heavy steel rings forming the frame work of the engine. These rings, or hoops, have a hub, connected by spokes to the former and it is in the hub that the single-throw crankshaft is carried. The crankcase is open and the cylinder barrels are cut short, so that at the end of the stroke the greater portion of the piston skirts is uncovered. One valve is mounted in the head and the other is placed horizontally. Cylinder dimensions of this engine are unusual, being 186 x 130 mm. It does not appear that this engine has been in service.

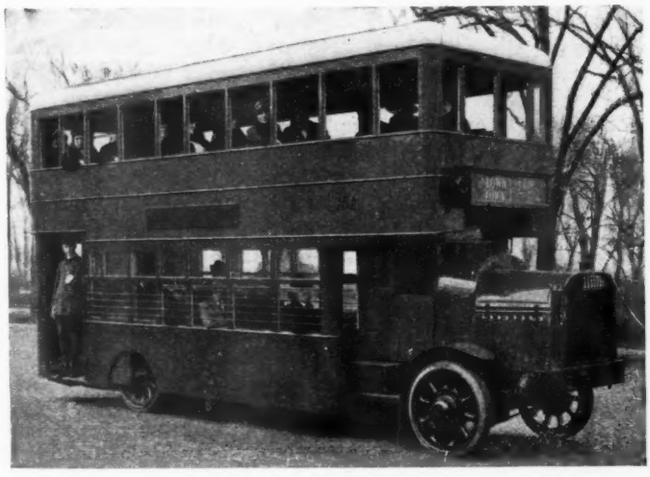
Double Deck Buses for Chicago

A MOTOR bus with a covered upper deck has made its appearance in Chicago as a part of the fleet of the Chicago Motor Bus Co. Mechanically, it is the same as those that have been operated there for the past three years. Like the older type, it has the front wheel drive, the floor on a level with the curbing for convenience and speed in taking on and off passengers and the covered straight stairway that is safer than the winding and exposed one. The difference lies in the covered top with glass windows in the sides, and in the seating capacity. Whereas the older type of vehicle would accommodate 51 passengers with seats, the new bus seats 60. Instead of the 22 inclosed downstairs seats in the old style bus, there are 60 inclosed and protected seats, 24 below and 36 above.

The length of the car is 25 ft., the width 7 ft. 6 in., and the height from roadway when unloaded, 12 ft. 11 in., and 12 ft. 8 in. when filled. The wheelbase is 176 in., the height of the lower deck from the roadway being 12¾ in. Both decks are lighted electrically by current from a generator driven by the engine. The vehicle is heated by exhaust gases from the engine which pass through pipes placed near the floor in the lower interior of the car. The front tires are 6 in. singles, while those in the rear of the same size are duals. The power unit is the American Motor Bus Company standard type of front wheel drive, made detachable and with a constant mesh transmission. The worm drive also is used. The brakes act on the rear wheels and have approximately 500 sq. in. of braking surface.

However, the salient feature of the new bus is the roof over the upper deck. This cover is light and is not too high to easily clear elevated structures and trolleys under which it must pass. Because of the low level of the upper deck the center of gravity in relation to the roadway is low, thus minimizing unpleasant swaying.

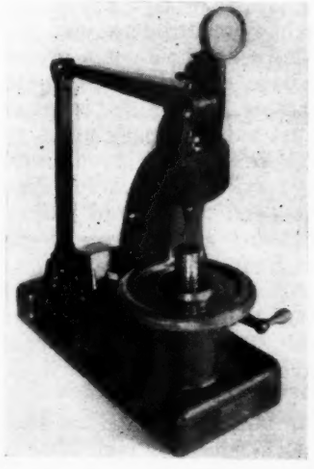
The front wheel drive and low hung body make the stepless feature possible. It allows the passenger to enter or leave the bus directly from the surface of the sidewalk. The only steps in the vehicle are those leading to the upper deck. They are straight and inclosed.



The new Chicago bus with covered upper deck

Testing the Degree of Hardness

A MACHINE for testing the degree of hardness of material should have flexibility in operation, that is, it should be adapted to the testing of flat as well as curved surfaces, in both thick and thin sections. It should be rugged in design, portable, rapid, and should not mar excessively the tested work. It should work well in testing all classes of material, hard or soft.



A machine embodying the qualities mentioned is manufactured by the S. P. Rockwell Co. The first model completed was of the horizontal type and was intended to test the concave raceways of ball bearing cups and cones. This was followed by a number of machines used for testing the component parts of firearms and automobiles, and finally the universal type was brought out and produced in quantity at reduced cost.

This apparatus can be used with equal facility in testing lead or the hardest steel, the shape of which is immaterial. The frame is a hollow piece of cast-iron supporting a plunger which holds a testing point just opposite a delicate measuring device. More or less pressure at the testing point can be secured by the mere movement of a weight. A chuck for holding the work is moved vertically by means of a hand wheel.

Rapid operation is one of the characteristics of the device. Even an unskilled workman can make six tests to the minute and twelve can be made after a little practice. The greatest value of this machine in the shop is for use as a comparative tester.

Analysis of German Trucks by the Motor Transport Corps

This article continues the report on the trucks surrendered to the A. E. F. under the terms of the armistice. The results of the investigations and tests are being made public as rapidly as they are completed for each truck.

By C. R. Hays*

Horch

THE engine has four cylinders, L head, cast in pairs, 5⅛-in. x 6¼-in. bore and stroke, four-point suspension, suspension by upper half of crankcase. Cylinders are held down by six ½-in. studs. Combustion chamber is flat type. Cylinders counterbored at base, walls ¼ in. thick. Valve guides are cast integral with cylinders, having machined recesses 1¼ in. from bottom for retaining valve springs. Valves are located on left-hand side of engine, with individual ports for exhaust valve, exhausting on the right-hand side, while the two inner intake valves have an intake passage, which connects and runs through the center of the cylinder block, passing partly around the inside cylinder, thereby making an oval-shaped opening. Water enters on the valve side between the intake valves, passing around valves and large water area, completely circulating around cylinders, and passing through a large water header, which is a bronze casting with flanged openings for each cylinder block, and cast integrally in one. This water header is held down by four ½-in. studs, having a hexagon base, with threaded portion screwed into combustion chamber. Priming cups are located directly over the exhaust valve. Spark plugs are located over intake valves. There are also countersunk bosses on the right-hand side of cylinder block for spark plugs. These bosses are drilled and tapped and plugged with hexagon cap screws. Exhaust manifold is of cast iron, having individual ports with hot spot located between the two centers, carrying sheet metal hot-air pipe connection around it. The intake manifold is an aluminum casting and of peculiar shape. This casting is so cast as to fit the curvature of intake passage around cylinder into combustion chamber.

Flywheel is of cast iron, 20 in. in diameter, 4½ in. wide. Counterbored for cone clutch. Thickness of rim, 1⅛ in. Semi-finished all over.

Crankcase, Crankshaft and Bearings

Upper half of crankcase is of cast aluminum, very heavily ribbed and reinforced at crankshaft bearings, having flanged openings for inspection plates on the right-hand side and a cast-in oil reservoir on the left-hand side, cast integral with the rear arm of motor support. The cylinder openings on crankcase are counterbored for the use of sheet metal oil baffle plates. Lower half of crankcase is an aluminum casting, with cast-in troughs for oil dippers on connecting rods, each having a separate drain plug. A cast-in oil trough for the camshaft extends the full length of case with small ribs for support. Oil pockets are cast in the webbing, which supports the main bearing of crankshaft.

Crankshaft is drop forged, machine finished, with flywheel hub and 8¼-in. clutch shaft forged integral on the crankshaft. There is also a machined oil ring for the prevention of oil flowing off the rear end on crankshaft. The short cheeks are 1¼ in. x 2¾ in., and the lower cheeks are 1 7/16 in. x 2¾ in. Long cheeks are chamfered at both ends, while short cheeks have slight fillets on ends. Thrust on crankshaft is taken through ball thrust, located in back of crankshaft gear.

Bearings are babbitt lined, bronze backed, no shims used, and lap joint, held in place by aluminum cap with steel, forged plates, doweled to cap and held by two ⅝-in. studs. These bearings are carried in the upper half of crankcase. Lower half of bearing has an H-shaped oil groove connected to two oil holes drilled through cap. The upper half has an H-shaped oil groove connected to one oil hole drilled through oil reservoir in case through bearing to the crankshaft. Front crankshaft bearing is 1 15/16 in. in diameter, 3⅞ in. long; center bearing, 1 15/16 in. in diameter, 3¼ in. long, and the rear 1 15/16 in. in diameter, 4 in. long. Located on front end of crankshaft and held by the timing gear case cover is a double row ball bearing.

Connecting Rods and Bearings

Connecting rods are offset, drop forged, I-beam type, semi-machine finished. Cap is held in place by four 7/16-in. bolts, and an oil scupper of copper tubing 1 in. long, elbow shaped, having a ⅜-in. x ½-in. opening and soldered in cap. Two countersunk oil holes are drilled 3/16 in. in upper half of big end, ¼ in. from each side of bearing. On small end of rod is a threaded end with nut used as a clamp for piston pin bushing. Plain check nut with cotter pin is used as clamping nut.

Connecting rod bearings are babbitt lined, bronze backed; no shims used, as they have lap joints. Diameter of bearing is 1⅞ in.; length 3⅜ in. Upper half of bearing is held in place by dowel; lower half by a slight extension of oil scupper; ⅛-in. oil grooves are cut in upper bearing, connecting with oil hole, having leads cut in bearing, while the lower half has oil grooves X shape; also a horizontal oil groove leading to oil hole for oil scupper. Piston pin bushing is of bronze offset and eccentric with oil holes and spiral oil grooves on inside of bearing.

Pistons and Pins

Pistons are of cast iron with conical head, 5¼ in. long, with three ¼-in. lap joint hammered concentric compression rings. On the inside of piston a cross-shaped rib

*Mr. Hays is chief of the experimental section, Motor Transport Corps.

supports the head of piston. Skirt of piston is 3/32 in. thick with a ⅛-in. x ¼-in. machined rib on bottom of skirt. No oil holes or oil rings in piston.

Piston pin is 1 in. in diameter, located 3 in. from top of piston and held in place by a 5/16-in. piston ring with a dowel pin in groove to hold it in place. Piston pin is very light, well constructed, hardened and ground.

Timing Gears

Timing gears are of the spur type, steel forgings, not hardened. Crankshaft timing gear is pressed on crankshaft and held by a straight key, 4 in. in diameter, 32 teeth, ¼ in. deep, 3/16 in. base of tooth, and 1¾ in. face. The camshaft gear is keyed to shaft and held in place by castle nut and cotter. Idler gear is mounted on shaft, with an adjustment consisting of a steel retainer, having two flat flanges, one on each side, and held in place by an adjustable lock ring with wire lock. Gear is adjusted up or down by two long studs, extending through boss and riding on flat surface of retainer. A check nut is provided on the stud, which also has slot in head. This adjustment is to take out back lash. Water pump and governor gears are of steel, not hardened, each mounted on shaft with adjustable retainers. The shafts of both of these gears run in small oil reservoir in arms of front engine support. A forged slot is machined on the front of both gears, each having a ½-in. drilled hole through center of gear for mounting the water pump on the left side and the governor on the right side.

Camshaft and Bearings

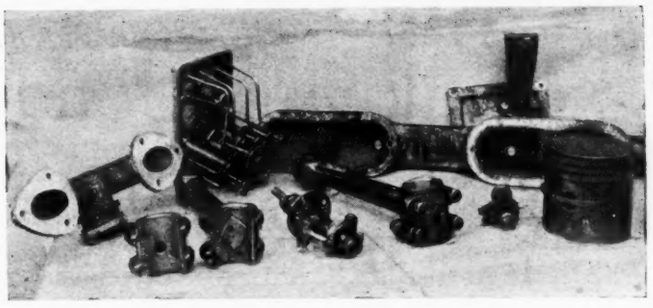
Camshaft is a drop forging with cams forged integral 1⅛ in. in diameter and hardened, cams being ground and shaft machine finished. Cam radius is 1 5/16 in., width ⅝ in., having a valve lift of 5/16 in. An eccentric cam on rear of shaft drives an air pressure pump, which bolts on top face of crankcase. Camshaft is supported on three sleeve type bronze bushings. Bearings are held in place by set-screws.

Valves

Valves are of the mushroom type, crown head, with 1/16-in. slot in center, diameter 2 9/16 in., ¼ in. thick, having a 45 deg. chamfer, ¼ in. wide, with valve stem 7⅝ in. long and ⅜ in. in diameter. Valve spring is held in place by a machined cap with a 1⅜-in. counterbore. The locking arrangement for valve spring consists of a steel retainer having a 13/32-in. eccentric hole with a 7/32-in. x ⅝-in. slot, which fits into a ⅛-in. milled slot on both sides of valve stem, and pressure of valve spring holds retainer in place. Valve caps are of bronze with copper gaskets on seats, having a hexagon-shaped boss on head and counterbored 1½ in. deep. Caps have ¾-in. center boss, drilled and tapped. A priming cup extension, with spark plug threads, is used on exhaust plugs, the extension being tapped for priming cup. The valves are protected by cast-iron valve covers.

Valve tappets are mushroom type; stem is of steel, hardened and ground, having a rectangular-shaped block 5/16 in. x 13/16 in. with oval ends, used as cam follower. The stem is hollow and tapped on top for a hardened steel, adjusting screw and jam nut. Valve tappet stem is carried in a cast-iron guide, having two 11/16-in. flat guides, screwed into base of body and used to keep valve tappet stem from turning. A forked flange cast integral with body is held down by ⅜-in. stud and nut. Valve tappet guides are held down in pairs, forked flanges facing.

Governor is a fly ball type, operating on sliding sleeve, having a coil spring for tension, and mounted on shaft which slides in face of governor gear, this gear meshing with idler gear. The governor itself is enclosed in a bell-shaped housing with a handle cover, carrying operating lever and shifting fork for operating governor. Governor housing is an aluminum casting bolted to gear case cover.



Parts of Horch engine, showing intake manifold, water manifold outlet, oil pump, governor, connecting rods, piston and rings, valve tappet and guide, inspection hole cover and breather

Oiling and Water Systems

Oiling system is by a combination forced feed and splash system. The oil pump is a plunger type, mounted on a cover, which bolts to the oil reservoir. This pump is driven by a worm on a cross shaft, which in turn is driven through spiral gears from rear end of camshaft. Pump draws its oil from the oil reservoir and forces it through oil leads to crankshaft bearings, camshaft bearings and front end gear cover. The oil is kept at a constant level in the oil troughs in lower case by an oil lead, which draws the oil from oil pan to oil reservoir through pump. Capacity of oil reservoir is two gallons. Crankshaft and connecting rods receive their lubrication by vapor, caused by splash of oil scuppers on bottom of connecting rods.

Water pump is a centrifugal pump 5 in. in diameter, having a bronze impeller, mounted in a cast bronze body, with a flange cast integral and bolted to front of gear case cover. The water pump is operated through shaft and coupling fitting into face of water pump gear and meshing with camshaft gear. The water enters through center of pump, through a cast in elbow and leaves directly overhead; inlet and outlet openings are 1⅜ in. in diameter.

Ignition

Ignition system is a single system high tension type ZR4 Bosch magneto. Magneto is anti-clockwise, with the customary advance by advancing the breaker box. For location of the secondary rotor a celluloid window is placed opposite contact number one in the secondary distributor cover. The magneto is on the left side of the motor and is driven by a shaft and flanged coupling.

Carburetor is a 1¾-in. vertical Zenith; the construction of this carburetor is identical with American Zenith.

Fan is 20¾ in. in diameter. Four blades. Riveted to steel casting with fan pulley machined on rear. An eccentric shaft is mounted on ball bearing with an adjustment screwed into fan hub. The adjustment of fan shaft is through a vertical shaft with one end threaded into boss on front gear cover, while the other end has a shaft and a turnbuckle. A steel forging with a split and clamp bolt fits over the vertical shaft, sliding up and down and clamped in place by a clamp bolt. There is also a key way cut the full length of bearing in clamp boss. This clamp boss has a horizontal boss with a bushed hole, which slides on fan shaft. An adjustment, consisting of a lever with a cup-shaped end, holding a stud with a screw eye joined to a coil spring, held at one end by a small bracket on gear case cover and at the other end by the stud. The tension is taken up through a wing nut which screws onto the stud.

Pistons, 6 lb. 1 oz.; connecting rods, 6 lb. 13 oz.; valve tappet assembly, 1 lb.; valve, 12 oz.; valve spring, 5 oz.

Studying Conditions Within the Cylinder by Indicator Cards

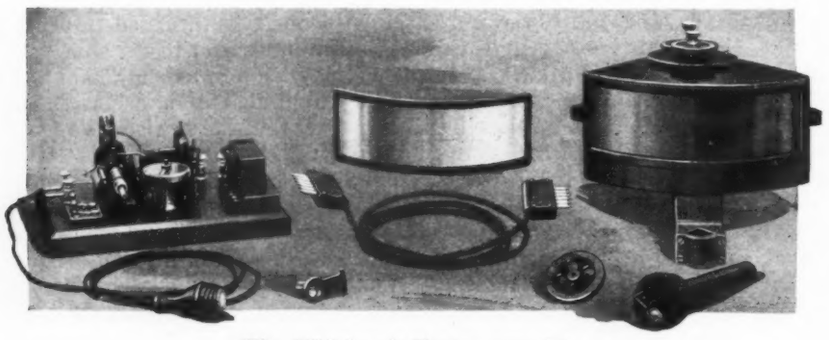
As a study of indicator cards leads to the improvement of the steam engine, so must the exploding gases be studied before the ideal combustion engine can be designed. A new device for testing cylinders is outlined here.

BY taking a pressure-time card, it is possible to spread the curves in such a way that a more thorough analysis of what is happening during the stroke can be made than when the pressure-volume card alone is used. During the week of the New York Show, suitable pressure-time indicators were brought widely into public notice, and engineers have become interested in them as a means for analyzing the performances of high-speed engines.

The analyses of the behavior of fuels in the combustion chamber, made by C. F. Kettering, H. L. Horning and others, in recent engineering discussions, have been largely the result of information obtained by the use of the Midgley indicator, made by the Dayton Wright Division of the General Motors Corp. By its use, it is possible to obtain accurate data on the compression values of various fuels in a given engine, the critical compressions for a definite engine design, character of combustion and ignition characteristics, as well as mean effective pressure, indicated horsepower and the various results with different valve settings, compression values and other adjustable engine features. This unit may also be used for studying manifold problems, to analyze distribution, fluctuations at various throttle openings, ramming effect, loading effect and the effect of the muffler on combustion.

The indicator is so designed that it is practically free from the effects of inertia at high speeds. It gives optical cards visible at all times. The cards can be put into permanent form by the use of paper sensitized to light so that it is not necessary to use either plates or films. The optical unit on the machine, giving a continuous graphical indication of conditions within the engine, makes it possible to adjust settings while the cards are being obtained, so as to note the effect of changes.

The instrument is composed of two separate units, one of which is connected to either the engine or dynamometer shaft and the other to the combustion chamber of one of the cylinders of the engine. A new development is making it possible for several combustion chamber units to be utilized at the same time. The interconnection between the engine or dynamometer shaft units and the combustion chamber units is electrical for taking the pressure-time cards and mechanical for taking the pressure-volume cards. These two units may be considered as composed of five elemental systems working in unison to produce the desired results. These are the pressure element, the optical system, the photographic system, pressure-time synchronizer and the pressure-volume synchronizer.



The Midgley indicator complete

The Five Systems

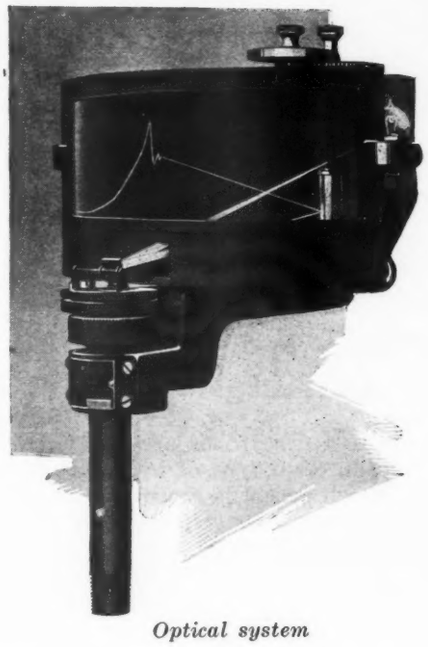
The function of the pressure element is to swing a pivoted mirror to such positions that, at all times, its vertical angle is proportional to the pressure in the combustion chamber of the engine.

The element is of the piston type and is compactly arranged into a unit, one end of which screws directly into the combustion chamber. Pressure in the cylinder operates against the piston to compress the resisting spring. This movement is transmitted through a very light shaft to an arm which operates to change the vertical angle of a mirror, supported on a horizontal axis, in proportion to the pressure on the piston.

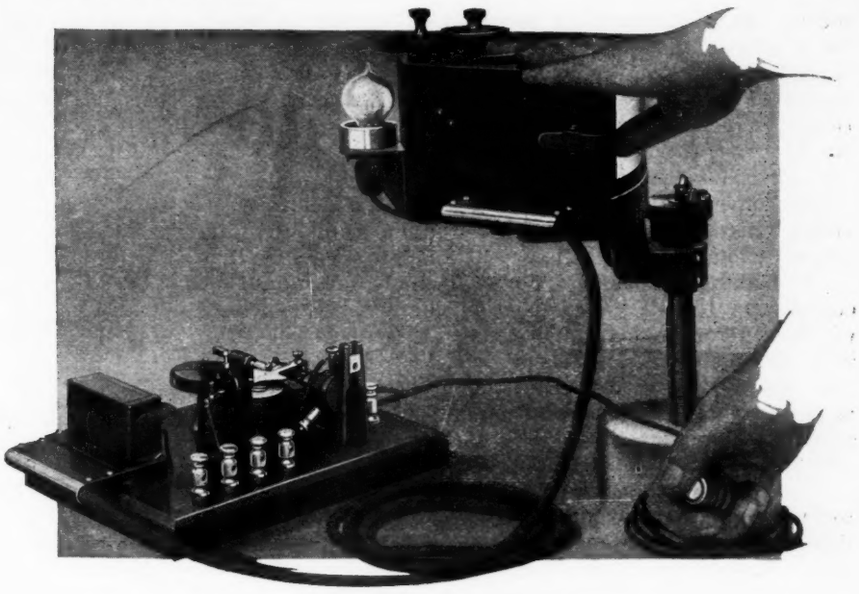
The pressure unit may be completely disassembled, thus making all its parts readily accessible for cleaning. Means have been provided for quickly making adjustments necessary to meet the requirements of different installations. Additional elements suitable for use in special cases may be obtained readily.

The function of the optical system is to provide a means for indicating either the pressure-volume or the pressure-time relations within the cylinder of an engine by a beam of light. It comprises a 6-volt light bulb, which is used as the source of light; a box called the motor box, supported by a bracket clamped to the pressure element; a concave mirror on the pressure element and a mirror in the form of an eight-sided prism at the rear of motor box.

When the system is in operation, light issues from a small aperture in a metal casing surrounding the light bulb, supported on the back of the motor box. This beam of light passes through the motor box to the concave mirror on top of the pressure-element. It is reflected and focused by the pressure-element mirror, and again traverses the length of the motor box to the eight-sided mirror in the rear, which may be either oscillated or revolved, according to whether pressure-volume or pressure-time cards are desired. The convergent rays of light from the pressure-element mirror, after being reflected by the eight-sided mirror, are projected forward upon the curved glass forming the front of the motor box. This



Optical system



Photographic arrangement

point of light moves up and down with a corresponding change in the angle of the pressure mirror. At the same time, it moves horizontally with the oscillation or rotation of the octagonal mirror, thus tracing out an image on the curved glass.

The function of the photographic system is to supply, during one complete cycle of the engine, a light bright enough to produce a sharp black line on the photographic bromide paper. In addition to the complete optical system, the photographic arrangement comprises a 10-volt battery and a device incorporated with the crankshaft attachment, which is so arranged that the ten additional volts may be applied to the lamp for just one complete cycle.

When a photographic card is desired a sheet of bromide paper is held against the clear glass front of the motor box. By means of a push button the circuit is closed through an electromagnet comprising a part of the crankshaft attachment. This magnet depresses a member which is then moved across a contact by a worm on the shaft in such a way that the voltage applied to the light circuit is increased to 16 volts for just two revolutions of the motor. The parts of the system are so arranged that a single operator may quickly and easily obtain sharp and clear-cut photographic indicator cards.

The Pressure-Time Synchronizer

The function of the pressure-time synchronizer is to rotate the eight-sided mirror located within the motor box so that its speed may always bear the same definite ratio to the speed of the engine. The system comprises a mechanism for attachment to the engine or dynamometer shaft and a synchronizer and rotating mirror in the motor box. The synchronism is accomplished electrically by energizing the coils of the synchronizer through a distributor operated by the shaft of the crankshaft attachment.

The distributor is so arranged that during operation the six coils of the synchronizer receive alternate impulses from three contacts in the distributor head. The eight-sided mirror located at the rear of the motor box is mounted on a shaft which is geared to the motor so that it rotates at exactly one-eighth engine speed.

The arc of the curved glass forming the front of the motor box has been made 90 deg. in order that a beam of light focused on and reflected from the rotating mirror is moved across the ground glass once for each revolution of the engine. At the point when the beam of light reaches the limit of the glass screen, the next succeeding face of the rotating mirror engages the focused beam of light and simultaneously reflects it to the opposite end of the glass screen. In this way, the pressure-time relations within the engine cylinder for two revolutions, or one cycle, are rendered completely visible on the ground glass as a pressure-time card.

The function of the pressure-volume synchronizer is to oscillate the eight-sided mirror within the motor box in synchronism with the reciprocating motion of the engine piston.

Included in the crankshaft attachment is a member driven by a crank attached to the distributor head and having a reciprocating motion in a vertical direction. A fine wire is attached to this member and carried over a light pulley to an arm which transforms the reciprocating motion into an oscillation of the eight-sided mirror about its vertical axis.

For projecting diagrams, the optical system functions just as in the formation of pressure-time cards, with the exception that the eight-sided mirror is oscillated instead of revolved, only one face of the mirror being used. The mirror oscillates in synchronism with the reciprocation of the engine piston so that the card produced indicates the pressure-volume relations within the cylinder.

The relation between the moving parts is such that the length of the card is just one-half that of the ground

Crankshaft attachment

glass. An adjustment is provided by means of which the length of the connecting rod for driving the reciprocating member in the crankshaft attachment may be so regulated that it bears the same ratio to its crank as the connecting rod in the engine bears to the engine crank. In this way, the error due to the angularity of the connecting rod is automatically eliminated.

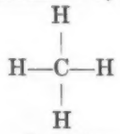
The conventional indicator card shows the relations between pressure and volume in the engine cylinder. The pressure-volume card is not well adapted, however, for use in making a study of the phenomena occurring during combustion in internal-combustion engines. The principal reason for this is that ignition and combustion occur when the piston is close to top dead center, during which time the horizontal movement along the pressure-volume card is so small that pressure changes are recorded merely as a single vertical line. The kerosene pressure-volume time card is preferable for observing the changes of pressure occurring during the combustion of fuels in a motor because the movement along the horizontal or time axis is always uniform, thus making changes clearly distinguishable. Note the card showing the fuel knock.

An engine knock is a noise in the engine that sounds like a hammering of one part against another. In addition to mechanical knocks, there are carbon knocks, spark knocks, pre-ignition, and pinking. It has been found, by means of cards taken on the indicator, that these disorders, with the exception of mechanical knocks, are due to fuel behavior and that they are aggravated by an early spark, by carbon deposit, or by too high compression. The knock occurs after ignition, and is evidenced by a sudden rise in pressure almost exactly at upper dead center, which is followed instantly by as rapid a drop in pressure.

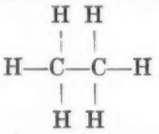
Structure of Fuels

The behavior of a fuel may be predicted by what is known as the structural formula of its molecule. No engineer hesitates to express physical relationships by curves, such as the power output of a motor. Such curves, however, serve only as a representation of certain relationships. The chemist makes use of structural formulæ to represent graphically certain relationships which exist within the molecule. The exact nature of these relationships does not enter into the present discussion, which merely takes up their present application.

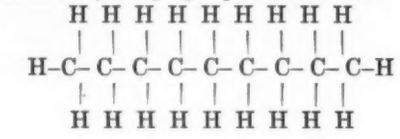
That property of an atom which causes it to combine with a definite number of hydrogen atoms or their equivalent is known as valency. The carbon atom is said to be tetra-valent, because it has the ability to combine with four hydrogen atoms, the valence of hydrogen being unity. The simplest combination of these elements is methane, which is a gas whose chemical symbol is CH_4, and whose structural formula is:



Another combination of carbon and hydrogen is C_2H_6:



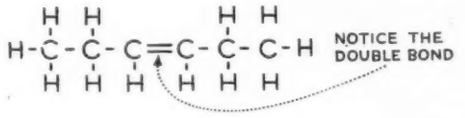
This type of expansion of the methane molecule may continue indefinitely. C_nH_{n+2} represented as:



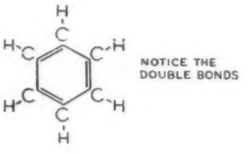
is the principal component of commercial Pennsylvania gasoline of the present day.

The compounds just described are said to belong to the paraffin series which is designated by the general formula CnH_2n+2.

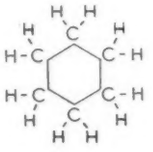
Another series of the same general type are the olefines, which differ from the paraffines in that the molecule contains less hydrogen, leaving CnH_2n as their general formula. One member of this series is hexylene, C_6H_{12}.



Both the above types of hydrocarbons are called chain compounds. A radically different type of hydrocarbon is the ring compound, of which benzol is the most common. The symbol for benzol is C_6H_6 and its structure is:



Six hydrogen atoms can be added to benzol, giving cyclohexane, C_6H_{12}, thus:



It will be noticed that hexylene and cyclohexane are both composed of six atoms of carbon and twelve atoms of hydrogen; but, on account of the fact that they are built up in different ways, their chemical and physical properties are quite different. They will be found to have different boiling points and specific gravities. But there is nothing mysterious about chemical structure. Consider, for example, a brick as analogous to an atom. The brick may go into the making of a brick walk, a house, or a wall, but there is no confusion among these objects. Similarly, C H may be built into hexylene or cyclohexane, two distinct compounds.

It can be shown that the structural formula expresses relationships existing within the fuel molecule which exert tremendous influence upon the behavior of the fuel during combustion, while the physical properties and elemental constituents influence its behavior very little. A classical example of this is the action of ether, and that of butyl alcohol. These two fuels are composed of the same relative amounts of carbon, hydrogen, and oxygen. So far as elemental constituents are concerned, they would be considered as the same fuel. But notice the difference in their boiling points and specific gravities. Ether is far the more volatile; it boils at 95 deg. Fahr. and has a specific gravity of 64 deg. B., while butyl alcohol boils at 242 deg. Fahr., and has a specific gravity of 42 deg. B. Common experience with gasolines, kerosene, etc., would indicate that butyl alcohol should be the worse knocker, but cards show quite the contrary. Ether exhibits a violent knock, while butyl alcohol gives no knock at all. This clearly shows that some other factor is affecting the action of these fuels. This factor is the difference of chemical structure, which is indicated by their structural formulæ.

The Design of Pneumatic Tired Trucks*

PART I

In this excellent two-part article, Mr. McCreery, of the Goodyear company, goes deeply into the proposed use of pneumatics on all sizes of trucks. Basing his argument on numerous tests, he presents a careful argument for the change. The second part will be published next week.

By C. M. McCreery†

THERE are two fundamental advantages which result from the use of pneumatic truck tires: (*a*) increased cushioning, and (*b*) increased traction. The increased cushioning is the most important factor because it has a greater effect on the performance of the truck. Elsewhere I will show that the cushioning ability of a pneumatic tire is four times as great as that of a solid tire of the same carrying capacity. As a result of this greatly increased cushioning there are six distinct advantages gained from the use of pneumatic truck tires:

(1) Faster transportation
(2) Economy of operation
(3) Less depreciation of fragile load
(4) Easier riding
(5) Less depreciation of roads
(6) Lighter weight trucks

The following data, substantiating these claims of advantages, were obtained from truck operators, each of whom took two trucks of the same make and capacity, one equipped with pneumatic and the other with solid tires, and operated them under exactly similar conditions, over the same roads and carrying similar loads.

Faster transportation or quicker deliveries result from the increased cushioning of pneumatic truck tires, as it is possible to obtain greater maximum and minimum speeds. Manufacturers of solid-tired trucks revoke their guarantee if a speed of 11 or 12 m.p.h. is exceeded, while pneumatic-tired trucks are being successfully operated at 20 to 35 m.p.h. In ordinary city or farm hauling, however, we are more interested in a greater minimum speed than we are in a greater maximum. That is, in running over rough city streets or country roads, a solid-tired truck must operate at low speeds because of the shock and vibration. It is therefore evident that if a truck on pneumatic tires will make more or longer deliveries in a given number of hours, its radius of operation is increased and also its earning power. Table I will show the increased mileage obtained with pneumatic tires by four truck operators:

TABLE I

Operator	Truck Capacity, tons	Period, months	Mileage on Pneumatic Tires	Mileage on Solid Tires
A	2	6	6,414	4,476
B	3½	1	1,995	675
C	2	5	5,510	2,223
D	2	4	7,014	4,677

The economy of operating trucks on pneumatic tires has been shown by the experience of many users. There is a considerable saving in gasoline, oil and upkeep. Furthermore, depreciation charges can be reduced considerably. The saving in gasoline is due to a lower power consumption resulting from the increased cushioning obtained. It is a well-known fact that vibration in a machine of any kind results in a loss of power. The vibration caused by the solid tires is practically eliminated by the use of pneumatic tires. A solid tire, in rolling over an obstruction in the road, lifts the entire load on the tire four times as high as it would be lifted in the case of a pneumatic tire. Many roads are full of small obstructions so that a certain amount of power is lost in lifting the load of the truck over them. The relative cushioning ability of the two types of tire seems to indicate that the power loss from this cause is four times as much for the solid as for the pneumatic type. There is also a saving in power in climbing hills. Because it is possible on pneumatic tires to approach a grade at a much higher rate of speed, less power will be consumed in climbing the grade; it will not be necessary to shift gears as soon, and possibly not at all. The saving in gasoline in the case of five truck operators is shown in Table II.

TABLE II

Operator	Truck Capacity, tons	Period, months	Miles per Gallon of Fuel: Pneumatic Tires	Miles per Gallon of Fuel: Solid Tires
A	2	6	5.77	3.98
B	3½	1	5.75	4.77
C	2	5	7.21	5.43
D	2	4	7.70	7.10
E	2	9	9.10	6.10

The saving in oil is probably due to the decreased vibration in all of the moving parts of the truck. The statistics from four truck operators, given in Table III, show that there is a considerable saving in oil consumption.

The upkeep or repair cost of a truck operated on pneumatic is much less than when operated on solid tires. This can be attributed to the decreased amount of vibration and the absence of severe shocks and jolts. It is found that parts do not have to be replaced and that the truck does not need to be overhauled as often. Reliable information has not been obtained, but the estimated saving in upkeep cost is from 25 to 50 per cent. There is also the subject of depreciation charges. As a result of experience our solid-tired trucks are written off on the basis of 60,000 miles of service, while the pneumatic-tired trucks are amortized on a basis of 80,000 miles. It seems that 80,000 miles is too low, because there have been trucks on pneumatic tires which at the end of 250,-

*Paper read at the truck and tractor meeting of the Society of Automotive Engineers, held at Chicago January 28. Condensed.

†Highway Transportation Division, Development Department, Goodyear Tire and Rubber Co.

000 miles were still in running condition. I believe that in the near future trucks will be written off on the basis of 100,000 miles. Taking all of these cost factors into consideration, it is found that the cost per mile of operating trucks on pneumatic tires is considerably less than that on solid tires. (See Table III).

TABLE III

Operator	Truck Capacity, tons	Period, months	Miles per Gallon of Oil: Pneumatic Tires	Miles per Gallon of Oil: Solid Tires	Cost per Mile in Cents: Pneumatic Tires	Cost per Mile in Cents: Solid Tires
A	2	6	104.0	59.0	45.0	56.3
B	3½	1	32.0	30.7	31.3	55.0
C	2	5	55.0	54.0	21.5	24.0
D	2	4	152.0	78.0	27.7	31.0

Let us now consider the lessened depreciation of fragile loads resulting from the increased cushioning ability of pneumatic truck tires. This is considered by many users to be one of the most important advantages. For instance, in hauling fragile materials, such as bottled goods and eggs, there is very little, if any, breakage. The farmer experiences very little depreciation in the live stock and produce which he hauls to the markets.

There is also the easier riding made possible by the use of pneumatic tires. In the case of delivery trucks, the elimination of the vibration makes it possible for the truck driver and his helper to ride almost continually without fatigue. This is of vital importance, especially in long-distance hauling where it is necessary to drive for hours at a time. Easy riding is essential in passenger buses from the standpoints of comfort and speed.

Before the motor truck can be utilized to the full extent of its possibilities, good roads are essential. However, along with the legislation providing these, laws are being considered and in some instances passed restricting motor-truck traffic. A pneumatic-tired truck has very little more harmful effect on an improved road than a passenger car. This is not true of a solid-tired truck. Because of the vibration and sharp jolts common to solid tires, any road will eventually break down under such traffic. The effect on dirt roads is the most harmful. The narrow, hard tread of the solid tire will soon cut into the road, whereas the soft, wide tread of a pneumatic tire will not. Attempts have even been made to prohibit solid-tired trucks from using certain roads, and on some of the principal thoroughfares of our cities this has already been done. In such cases pneumatic truck tires have a distinct advantage.

Increased Traction

The discussion so far has considered only increased cushioning. The advantages of increased traction will now be stated. Increased traction is made possible by the greater width of the pneumatic tires, their non-skid treads and their greater flexibility, which allows the surface of the tire to conform more nearly to the unevenness of the road, thereby getting a better grip. There is approximately twice the area of ground contact with pneumatic as with solid tires of similar capacities. As a result of this increased traction, we obtain reliability and safety. By reliability, we mean that it is possible for the truck to operate successfully over almost any kind or condition of road, and during all seasons of the year. By safety, is meant that because of the increased traction of the tires, the truck will hold the road better and the brakes will be more effective.

We have so far discussed only the advantages of using pneumatic tires on trucks. I think it is advisable to mention some of the arguments which have been advanced against the use of pneumatics and truthfully answer them as experience has shown that they can be answered. All of the arguments against the use of pneumatic tires can be placed under either of the following: (*a*) cost and (*b*) practicability. The question of cost will be discussed first. It is now found that the matter of cost is subdivided into two parts: (*a*) initial cost, and (*b*) the possible loss due to injury and abuse. While it is true that the initial cost of pneumatic-tire truck equipment is greater than that of solid-tire equipment, it has been proved by the experience of many truck operators that this difference is more than offset by the greater earning power and the lower cost of operation. It has usually been found that in four to six months time the increased cost of the pneumatic-tire equipment is completely wiped out. When the time comes that specially designed pneumatic-tired trucks make their appearance, this increased cost will be offset by the lower initial cost of the truck itself, and the greater economy of operation.

Practicability of Pneumatic Tires

As to possible loss due to injury or abuse of the tires, it has been found that this is not a serious objection. There are innumerable instances where pneumatic truck tires have run from 12,000 to 20,000 miles on the original air. As the development of the tires themselves has progressed, so has the successful repairing of the tires been worked out. Repair molds and retreading equipment are now in use in many parts of the country and are being placed in other localities as rapidly as possible, so that it will be no more difficult to have a pneumatic truck tire repaired than any other part of the truck. While it is possible to injure pneumatic truck tires by abuse, this is no more likely to happen to the tires than to other parts of the truck, and it is possible to repair most of the injuries that tires receive from abuse. As truck operators become more accustomed to the use of pneumatic tires, such failures will be reduced to a low minimum.

The practicability of pneumatic truck tires has probably been questioned more than has any other feature. The first thing to be discussed under this subject is that of delays due to changing tires. The amount of time necessary to change a tire depends in part upon the type of rim equipment. In the case of detachable rims, where it is necessary to remove the tire from the rim, replace it and then inflate it, not more than 30 min. is required to perform the entire operation. In the case of a demountable rim, a change can easily be made in 15 min. I am not trying to argue the relative merits of the two types of rim, but is an occasional delay of from 15 to 30 min. to be considered when we know that we can save hours, not minutes, every day that the truck is in operation when it is equipped with pneumatic tires? The truck driver is not required to make a tire change very often and little difficulty may be expected.

It is often said that it is not possible to maintain the high-inflation pressure required for pneumatic truck tires. Very little difficulty has been experienced in this respect. Most garages and service stations carry sufficient air pressure to inflate tires up to 42 x 9 in. size, and many are preparing to take care of the largest sizes. By the time the largest tires are in general use there will be generally available air at a sufficient pressure to keep them properly inflated. Trucks equipped with detachable rims, or operating in long-distance or inter-city service, are usually equipped with small air compressors. One objection which is not mentioned so much now as when pneumatic truck tires first made their appearance, is the danger of the high inflation pressures. Pneumatic tires are made to withstand three to four times the pressure carried in them.

The large outside diameters of the tires are often objected to because they affect the truck ability and because they raise the center of gravity. In changing over a solid-tired truck to pneumatics, there is the possibility of reducing the ability of the truck. Our experience has shown that unless the truck is operated over a very hilly route, its ability has not been noticeably affected. There have been too many successful change-overs to allow this to become a serious objection. Looking into the future, this question of truck ability and gear ratios will be taken care of by changes in design. So the question of change-overs is only temporary. Raising the center of gravity is not as serious as it might seem. The question of getting the load into the truck has not been a serious question at all. I do not believe that the loading platforms are of such uniform height that a little change in the height of the truck platform would make a great difference.

I have heard it said at different times that in case of a large rear tire suddenly going flat, the sudden drop of the truck might turn it over on a crowned road. When a big tire goes flat, it does not do so suddenly. The blow-out or cut in the tire is never very large, so that it takes some time for the air to escape. Therefore, the truck does not tip suddenly. Furthermore, when all of the air is out of a 48 x 12 in. tire, the largest now made, there is a drop of only 5 in. Now assume that the tread of the rear wheel is 66 in., the list of the truck would be approximately 4½ deg., which is not enough to cause the truck to turn over, and to my knowledge no truck has ever overturned from this cause. The sizes that have been worked out during the past six years are now standard. Table IV gives the rim sizes, normal tire sizes and the tires which can be fitted as oversizes.

TABLE IV

Rim Sizes, in.	Normal Tire for Rim, in. (Original equipment on new trucks)	Oversize Tire for Rim, in. (Intended for convenience of consumer and not for original equipment)
34x 5	34x 5	36x6
36x 6	36x 6	38x7
38x 7	38x 7	40x8
40x 8	40x 8	42x9
[2]40x 8	42x 9	
[2]44x10	[2]44x10	
[2]48x12	[2]48x12	

[2]These sizes are not S. A. E. tire and rim sizes.

You will notice from this table that there is no oversize possibility when 9, 10 and 12-in. sizes go out on new trucks because the oversizing plan falls down above the 9-in. size, on account of the size and stiffness we are forced to build into the beads as designed at present.

Tires give the greatest satisfaction when they have plenty of cushioning and not too much flexing. The latter condition is what breaks down a tire, when run under conditions which produce a deflection of from 12 to 15 per cent of the section diameter, or 12 to 15 per cent of the height above the rim. The deflection can be controlled by regulating either the load or the pressure, or both. Table V gives the maximum load and required inflation. The pressures are practical to maintain, the tires are built accordingly and we get satisfactory practical results in first cost and mileage delivered, if the table is followed.

TABLE V

Tire Size, in.	Extreme Maximum Allowable Load per Tire, lb.	Inflation Pressure, lb. per sq. in.
34x 5	1,700	80
36x 6	2,200	90
38x 7	3,000	100
40x 8	4,000	110
42x 9	5,000	120
44x10	6,000	130
48x12	8,500	140

I want to take this opportunity to mention under-inflation and overload. Both evils result in an excessive deflection of the tire which means that an excessive shearing action is put upon the rubber between the plies and also upon the cushion built into the tire between the tread and the plies. This in turn results in a separation of the parts and the tire is on the road to failure.

The weights of practically all makes of trucks of a given capacity are nearly the same when under full load, and it is possible to specify what the pneumatic tire equipment should be on any truck of a certain carrying capacity. The bodies of all the trucks are assumed to be standard stake bodies, and heavy bodies might in some cases necessitate a revision.

TABLE VI

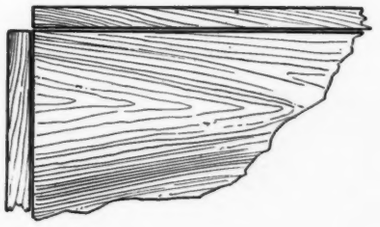
Size of Truck, tons	Front Wheels: Maximum Weight per Wheel, lb.	Front Wheels: Pneumatic Tire Size, in.	Rear Wheels: Maximum Weight per Wheel, lb.	Rear Wheels: Pneumatic Tire Size, in.
¾	800	4, 4½ or 5	1,600	34x 5
1	1,000	4½ or 5	2,100	36x 6
1½	1,200	4½ or 5	3,000	38x 7
2	1,500	34x5	3,500	40x 8
2½	1,800	36x6	4,000	40x 8
3	2,000	36x6	5,200	44x10
3½	2,100	36x6	5,700	44x10
4	2,300	38x7	6,500	48x12
5	2,700	38x7	7,800	48x12

Special Box Corner Design to Prevent Loosening of Metal Straps

METAL strapping applied to a box made of thin material cannot be fastened by nails driven into the edges of the boards, but must be joined by one of the various fastening devices and held in place by tension.

When first applied, the strap is very tight and no difficulty is experienced in keeping it on the box, but when the box is stored for a period of several months the shrinkage of the lumber usually reduces the circumference to such an extent that the strap falls off in transportation.

Such loosening of the straps may be successfully prevented on boxes carrying a commodity which has sufficient strength to resist the strap tension, by building the box in such a manner that neither the top nor bottom laps



the sides. The accompanying sketch will make the construction clear. The strap is applied in the usual manner and drawn very snug. The tension of the strap is sufficient to spring the sides, top, and bottom of the box in against the contents so that the corner boards lap in the center. The middle of the box is the smaller, and the straps will not slip off.

The Automotive Industry in Germany Faces Heavy Demands

This article was written by a German engineer and writer at Berlin, and is one of the few accounts of automotive activities in the enemy country recently received in America. It is presented here in line with the policy of this publication of keeping its readers informed on events of interest to the industry in all parts of the world.

BERLIN, Jan. 28, 1920.

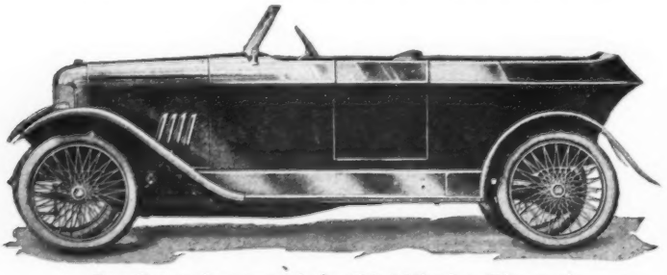
THE situation of the German automobile industry is doubtless favorable, especially as the truck manufacturing firms have booked large commissions, which render it feasible to hold the factories busy for a long period. As the manufacturing of automobiles is still controlled by the government, motor trucks may be sold to private persons only with special permission. Passenger cars, however, may be sold freely, as the restrictions thereon have been raised. As the inquiries for passenger cars from private customers are numerous, this branch of car-making also has a satisfactory outlook. Among the accessory firms the situation is similarly favorable.

As things now stand, the factories will be occupied by the present commissions for a comparatively long time, owing to the decreased working-power of the workmen, and a change in the situation cannot be expected for the time being. On the other hand, the German industrial leaders reckon with considerable selling difficulties as soon as American cars and accessories gain admission.

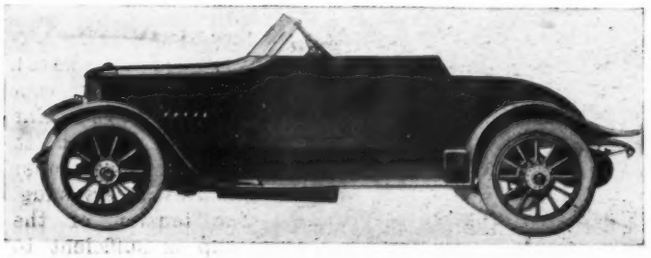
Despite the raising of restrictions in the rubber industry, the provisioning of automobiles, especially passenger cars with tires, is very insignificant, and the prohibition of automobile traffic therefrom is considerable. Frequently the tire factories offer pneumatic tires of so-called "peace quality," but the prices are, generally speaking, still very high and a decrease cannot be expected on account of the exorbitant wages and expenses.

Before the war each factory in Germany was building the greatest possible number of different car types for the sake of offering its customers a "selection," and comparatively small factories, which produced less than 1000 cars in the year, distributed this production among ten to twelve types of passenger cars and trucks. This frittering extended up to each part of the automobile. Prior to the war there were no less than forty-two different tire sizes in Germany, and in the same car the sizes for front and back wheels were different. Wheels of the same size had different hubs; thus the interchangeability of wheels was impossible.

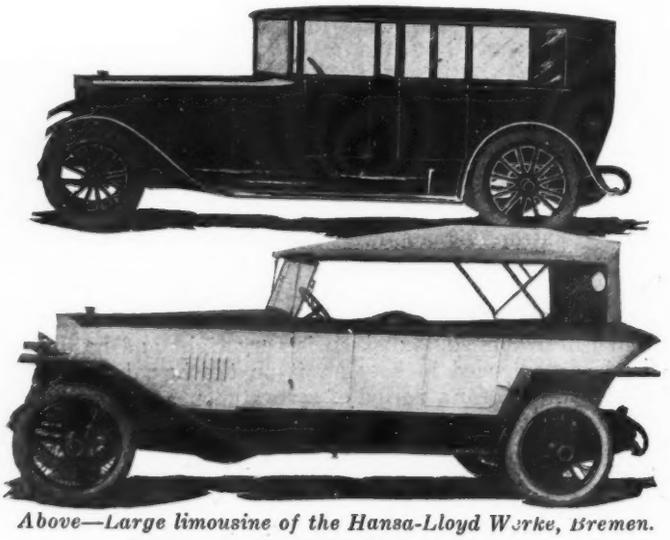
To avoid these drawbacks, several automobile factories have constituted a so-called community of interests, or better, of production. The first consolidation in this manner is the G. D. A. (Gemeinschaft deutscher Automobilfabriken), to which belong three of the largest German factories, namely the N. A. G. (Nationale Automobil Gesellschaft), at Berlin, the Hansa-Lloyd Werke, at Bremen, and the Brennabor Werke, at Brandenburg. These companies work together and each of the factories is building only two types, but in large number. A common central office purchases the raw material and common branches sell the cars, with the result of considerable savings in the expenses for rent, office staff, etc. The N. A. G. builds only a passenger-car type of 10-30 hp. and a truck type of 3 to 4 tons. The Hansa-Lloyd Werke builds a truck of 1 to 1½ tons and a 16-45 hp. passenger car, while the Brennabor Werke makes two small passen-



Small touring car of the Dixi Werke, Eisenach



Small roadster of the Stoewer Werke, Stettin



Above—Large limousine of the Hansa-Lloyd Werke, Bremen.
Below—Large Hansa-Lloyd touring car

ger cars under 10 hp. rating. The Hansa-Lloyd Werke continues, however, to build their well-known motor plows, electromobiles and fire brigade automobiles.

In a similar manner the D. A. K. (Deutscher Automobil-Konzern) was formed. To it belongs the following smaller factories: Dux Automobilwerke, Leipzig; I. D. Magirus, Ulm; Presto Werke, Chemnitz, and the Vomag (Vogtländische Maschinenfabrik A. G.), Plauen. The entry of other firms into this union has been provided for. The large Reichswerke, at Spandau, which has produced munitions, shell and artillery for more than sixty years, intends now to manufacture motorcycles and motor-plows.

The bodywork of German cars differs somewhat from the American practice. Almost all cars in Germany have V-fronted radiator and concealed hood. The 18-hp. roadster of the Stoewer Werke, Stettin, is a typical example of finest German bodywork. The radiator is V-fronted, as well as the wind-screen for reducing the air resistance. This construction is expensive, of course, and more difficult to repair, but it gives the car the speedy, rakish appearance liked by German customers. For the same reason, the hood is concealed in a recess between the back of the seats and the body and regularly closed by a lid. The body is painted in two colors, whereby the top side has always a black or darker color than the remainder of the body. As in all German cars, the steering post is on the right side, therefore only one door at the left side is provided.

The small four-seater of the Dixi Werke, Eisenach, has half-round radiator, concealed hood and only one side door. The body has a horizontal projecting edge at the top side, characteristic of this type of bodies. The large Hansa-Lloyd touring car shows almost the same features, but the radiator is V-fronted, the body is painted in two colors, there are two side doors and the mud-guards have the angular form preferred by some firms.

In closed cars, the V-fronted radiator and wind-screen are also kept up. The large limousine of the Hansa-Lloyd Werke, Bremen, has not the somewhat clumsy appearance shown by many closed cars.

These bodies are good examples of the new trend in German body design.

Bicycle with Colibri motor drive

An engine drive for bicycles is not unknown in the United States, but those of American origin follow other principles than those of a new German design. The drive, named "Colibri," is mounted on the front fork and pulls the bicycle. The Colibri front drive will diminish the dangerous skidding, also the weight will be less. It consists of an air-cooled, four-cycle, mono-cylinder engine of 1½ hp., mounted on a fork frame of steel tubes. This frame must be attached beside the front fork of the bicycle and is connected to the bicycle frame by spring joints. The vibrations of the engine thus are kept aloof from the bicycle frame, which could not stand such detrimental strains for a long period.

The engine drives, with a short chain, a secondary shaft, which contains the declutching device and, from this shaft, the chain wheel at the front hub of the bicycle is driven with a longer chain. By declutching, the bicycle can be driven with pedals. The motor has a high-tension magneto and jet carbureter. The fuel tank is mounted at the steering bar and from the handles of this bar the throttle and clutch are controlled by Bowden wire. To prevent splashing of oil on the driver, the back and top side of the fly wheel is covered by a sheet guard. The weight of the complete Colibri motor drive is 36.2 lbs. (16.5 kg.), the speed ranging from 18 to 25 m.p.h., with small fuel consumption.

Revalidating American Trademarks in Germany

UNDER a recently outlined course, the German Commissars have indicated that the taking over of American trademarks in Germany was only the result of a compulsory administration, and that, in order to give absolute protection to American trademarks in the future and remove any doubt of their legality, the present German Government is willing to accept registrations for American trademarks at this time to the end of revalidating and registering the same.

This indication assures American manufacturers interested in a desire to continue to do business in Germany and to protect their mark there, and all who formerly registered their mark in those countries, an unusual opportunity. Business executives should give these matters immediate attention so that their boards of directors may act and take advantage of the new situation.

It is to be regretted that in American business circles our busy executives do not give their trademark matters personal attention; they seldom reach the board of directors meetings. Trademark details have been passed to minor clerks, or clerks who have only an inkling of patent law, and more or less handled as side issues to the patent features of large business interests. They deserve a much larger consideration.

With the foreign trademark situations, business executives are daily signing at the request of patent attorneys blank powers of attorney, which are forwarded to all parts of the world. The practice has been part of a loose system concerning foreign registration of trademarks for many years and has caused an endless amount of trouble to many American manufacturers. The abuse of these powers of attorney has occurred, not in a few instances, but in hundreds, in almost every country of the world.

Trademark rights in Germany will continue to remain property rights in the Republic of Germany, just as they remain property rights in the several states of the United States. There is no such thing as "a common law right" in trademarks in Germany and, even here in the United States, the so-called common law right in a trademark is a much misquoted term, as expressed in encyclopedias, etc.

The next few years will witness an endless number of lawsuits in the United States and foreign countries regarding trademark situations that have arisen as a result of the war.

Trails of Peru Have Been Converted Into Highways

Road construction is being pushed in Peru and will be increased greatly when more funds become available. Compulsory service to help build roads has been suggested by several enthusiastic newspapers. Lima is best Peruvian market because of its wealth and population.

By Allen Sinsheimer

ROAD conditions influence the sale of automobiles in Peru most importantly, just as they do in all other Latin American countries, but the Peruvians take eagerly to automobiles wherever their use is possible, according to reports from the Bureau of Foreign & Domestic Commerce. There are only 1700 miles of railway in Peru's 700,000 square miles, and the chief transportation hitherto has been by pack mule. But their trails are being converted rapidly into highways, and cars and trucks are bringing new life to formerly isolated centers of mining and agricultural production.

The Peruvian Government adopted a comprehensive plan for a road system in 1916, but funds are not available in large amounts, and only short sections of highways are under construction to meet the most pressing needs. Railway costs have increased and, in consequence, enthusiasts are advocating the building of automobile roads. Peruvian newspapers have suggested a compulsory road service for all men from 18 to 60 years of age, payable in personal or hired labor. The wealth of Peru is limited as only 10 per cent of its 5,000,000 inhabitants are white. This delays highway construction and limits the general use of automobiles.

American automobiles became popular during the war, as is shown by the record herewith of exports from the United States to Peru in the last seven fiscal years (July 1 to June 30, inclusive).

Import figures show that in the last seven years the United States exported to Peru 2076 cars and trucks, 90 per cent having been shipped in the last three years. Passenger cars, with an average value of $1142, from 1913 to 1917, comprised nine-tenths of the whole; the average value was $753, while in 1918 and 1919 it increased to $1321. The total annual value increased 1541 per cent from 1913 to 1918. The decrease of the 1919 shipments was due to war-time restrictions.

Motor truck shipments to Peru were negligible until 1917. One hundred and ninety-four trucks have been shipped in the last three years, as compared with ten in the previous three years. The average price of trucks shipped since 1916 was $2037. Part shipments have increased more than truck or car exports and tire purchases have multiplied even faster, the 1919 exports having been 228 times those in 1913. The motorcycle trade has been comparatively small.

That the United States has had the largest share of Peruvian automobile trade since 1912 is indicated by the official statistics. The effect of the war is noticeable in the decreased imports in Peru in 1914 and 1915, and the growing demand for American cars is shown by the notable rise in 1916, at which time Peruvian prosperity aided American manufacturers considerably in opening the market for their cars.

The increase in all motor imports in 1917 was largely due to the prosperous marketing of Peruvian products, as a result of war conditions. The fluctuations in Peru's imports appear in the accompanying table of imports of motor cars, trucks and tires, in the calendar years 1912 to 1917 inclusive.

The total value of the imports of cars and trucks into Peru increased 460 per cent from 1912 to 1917. The receipts of passenger cars grew 432 per cent, motor trucks 1279 per cent, and tires 1818 per cent. The United States' share of Peruvian automobile trade was 32 per cent in 1912, 37 per cent in 1913, and 98 per cent in 1917. Belgium was first in 1912, with 34 per cent, but fell to less than 10 per cent in 1913 and 5 per cent in 1914. France was third in 1912 with 23 per cent, 31 per cent in 1913, and 27 per cent in 1914, dropping after that to an insignificant position. Germany had 15 per cent of the automobile trade in 1913, the only year in which it reached a high percentage.

Ninety per cent of passenger cars imported into Peru come through Callao, thence to Lima, the principal mar-

PERUVIAN IMPORTS FROM THE UNITED STATES

Years	Commercial Cars No.	Commercial Cars Value.	Passenger Cars No.	Passenger Cars Value	Parts Value	Tires Value	Motorcycles No.	Motorcycles Value	Total Value
1913	..	.....	70	$55,646	$2,550	$1,273	..	.....	$59,469
1914	3	$5,301	36	31,362	5,982	4,838	3	$632	48,115
1915	2	3,484	24	20,658	4,727	5,253	3	847	34,969
1916	5	5,880	59	40,388	5,458	9,663	8	1,576	62,915
1917	25	48,776	400	295,558	27,332	27,934	25	4,546	404,146
1918	73	155,834	784	913,669	88,098	107,236	5	1,108	1,265,940
1919	96	190,677	499	782,085	165,025	290,398	7	1,540	1,429,725

SIDE GUIDE AND GRIPPER

SIX YEARS OF PERUVIAN IMPORTS

Countries of Origin	1912 Passenger Cars	1912 Motor Trucks	1912 Tires	1913 Passenger Cars	1913 Motor Trucks	1913 Tires	1914 Passenger Cars	1914 Motor Trucks	1914 Tires
United States	$37,652	.....	$720	$71,898	$1,026	$5,124	$24,804	$11,261	$4,355
Belgium	40,694	.....	628	17,792	.....	53	6,326	.....	.....
France	27,364	.....	1,937	59,493	.....	4,341	23,194	.....	7,971
Germany	715	$3,917	443	19,417	.....	12,652	5,426	4,866	1,645
United Kingdom	.....	.....	311	6,292	.....	1,139	5,922	.....	156
Other Countries	4,798	.....	87	6,078	.....	185	17,607	.....	131
Total	$111,223	$3,917	$4,126	$180,970	$1,026	$23,495	$83,279	$16,127	$14,258

Countries of Origin	1915 Passenger Cars	1915 Motor Trucks	1915 Tires	1916 Passenger Cars	1916 Motor Trucks	1916 Tires	1917 Passenger Cars	1917 Motor Trucks	1917 Tires
United States	$33,233	.....	$6,930	$108,104	$6,667	$17,110	$589,259	$50,655	$74,857
France	3,163	.....	4,102	9,032	194	4,200	.....	3,377	3,883
United Kingdom	316	.....	1,080	9,047	.....	5,027	.....	.....	263
Other Countries	2,254	.....	404	3,144	.....	282	2,579	.....	165
Total	$38,966	.....	$12,516	$129,327	$6,861	$26,619	$591,838	$54,032	$79,168

ket and distributing center. The values of motor car imports into Peruvian ports in 1913 and in 1917—the last pre-war and a mid-war year—appear in the following table:

Ports of entry	1913 Passenger cars.	1913 Motor trucks.	1913 Tires.	1917 Passenger cars.	1917 Motor trucks.	1917 Tires
Callao	$166,965	$1,026	$22,999	$555,559	$44,109	$69,119
Mollendo	5,231	....	112	4,127	.....	3,587
Paita	....	....	....	5,056	6,867	165
Pisco	3,509	....	370	13,743	.....	1,552
Salaverry	5,265	....	....	7,762	365	2,307
All other ports	....	....	14	5,591	2,691	2,292
Total	$180,970	$1,026	$23,495	$591,838	$54,032	$79,022

The northern Peruvian ports, Paita and Salaverry, are prosperous export points for Peruvian sugar, cotton, cattle and hides. Callao exports copper and silver; the southern ports, Pisco and Mollendo, are outlets for grain, wool and copper. Iquitos, the port of the Peruvian Amazon, receives few motor cars, as the opportunity for use there is almost negligible.

The wealth and population of Lima make it the best Peruvian market. It has 140,000 inhabitants and is eight miles from Callao, which has 30,000. In 1918, Lima issued licenses for 899 automobiles, an increase of 338 over 1917, 637 in 1916, and 668 more than 1915. Seventy-five per cent of these cars are privately owned.

With the execution of present plans for paving the streets of Lima, there will be better opportunities for the sale and use of cars. The city plans to pave its principal streets with concrete and asphalt. Macadam has not proved satisfactory in Peru because of the aridity of the country. New roads already constructed include a speedway connecting Lima with several suburban and seaside resorts, a road from Lima to Chosica, another from Lima to Canta, and a third between Lima and Callao. A regular freight service is being maintained by cart drivers between Lima and Callao which it is expected soon will be replaced by motor trucks.

Mollendo, the second Peruvian port in automotive imports, supplies the city of Arequipa, with a population of 50,000. At present Arequipa is a poor automobile market because of cobblestone roads; that, however, will be reconstructed soon. Mollendo also supplies Cusco, a city of 30,000, with narrow and inferior roads, too poor for automobile travel.

A longitudinal post road is in prospect from Lima to Canete on the south and to Piura on the north. Other proposed roads will connect the Pacific with the Amazon system. An automobile road was completed in 1917 on the eastern slope of the Central Andes, connecting the city of Tarma with the railway at Tilarnioc. The opening of this road was celebrated by a procession of motor cars, and a regular service of cars and trucks is now maintained over this 25-mile route.

Other districts are showing an interest in highways, including the department of Cajamarca, and between the cities of Cerro de Pasco and Huanuco, another from Cerro de Pasco to Huancayo, and from the latter to Izcuchaca.

The best location for automobile agencies, according to the former American Consul at Lima, are: Lima for central and northern Peru and Arequipa for the south. Some American manufacturers have resident representatives in Lima who control agencies at Arequipa, Mollendo and other cities. There are no wholesalers handling automotive parts exclusively, but samples of such goods are to be found in the wholesale and retail hardware establishments. The car dealers also handle tires and accessories. The importing houses are chiefly of European origin and it is expected that European importers will again strive to compete with American cars.

Advertising has not been developed, but automotive motion pictures and illustrations in newspapers, it is thought, would prove profitable. Automotive sales in Peru depend upon repeated and successful demonstration. Billboard advertising is subject to tax. Electric signs are little used. Single catalogs are free of duty, but quantities are dutiable at 1 cent per pound, and metal signs at 8.8 cents a pound. The duty on passenger cars is 11 per cent ad valorem including surtax, 22 per cent on limousines, $4.86 per 100 lbs. on parts, $24.28 per 100 lbs. on tires, 33 per cent on motorcycles. Motor trucks are admitted free. Municipal licenses must be paid every six months, the fee being $8.76 for private cars and $4.86 for public cars. A driver's license is required, but no charge is made for it.

The Peruvian preference is for moderate priced cars and especially open ones. The demand for small motor trucks from 1½- to 2½-ton capacity is marked and standard American makes of tires are generally pre-

ferred, the non-skid being most popular. France and Germany supplied the greater part of the tires before the war and France has continued to send a share, although the United States is shipping 93 per cent of all that are now used. The metric system is employed in Peru. Tires should be in metric sizes and, likewise, speedometers should give distances in kilometers. Gasoline is selling for 60 cents per gallon and oil at $1.60 per gallon, but these prices are apparently without effect on the operation of cars, the imports of which have averaged fifty per month.

An educational propaganda, concludes the report, is imperative in Peru. Agents for cars must regard repeated demonstrations, full instructions to drivers and the establishment of adequate service stations as features essential to success.

Tractor Performance at the British Tractor Trials

The accompanying tabulated data is compiled from the official tests made at Lincoln, England, Sept. 24 to 27, 1919. These figures supplement articles on the tests previously published in AUTOMOTIVE INDUSTRIES.

NAME OF TRACTOR	Made In	H. P. Rating	No. of Cylinders and Position	Bore and Stroke	Fuel	Total Weight	Weight on Drive Wheels or Track	Dynamometer Tests on Wet Heavy Clay Land: Pull to Skid Wheel (lb.)	Dynamometer Tests on Wet Heavy Clay Land: Sustained at Plowing Speed, Pull (lb.)	Dynamometer Tests on Wet Heavy Clay Land: Draw bar H. P. Shown in Test (lb.)	Results of Plowing on Heavy Clay: No. of Plows	Results of Plowing on Heavy Clay: Width of Plow	Results of Plowing on Heavy Clay: Depth of Plow	Results of Plowing on Heavy Clay: Rate of Plowing in Acres per Hour	Results of Plowing on Heavy Clay: Fuel Used per Acre (Gal.)	Results of Plowing on Light and Medium Loam: No. of Plows	Results of Plowing on Light and Medium Loam: Width of Plows	Results of Plowing on Light and Medium Loam: Depth of Plows	Results of Plowing on Light and Medium Loam: Rate of Plowing in Acres per Hour	Results of Plowing on Light and Medium Loam: Fuel Used per Acre (Gal.)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Alldays	England	30	4V	4⅜x6½	G&K	6,720	4500	4100	3300	15	....	....	....	....	....	....	....	....	....	....
Alldays	England	30	4V	4⅜x6½	G&K	6,720	4500	....	....	....	4	10	5½	0.57	5.0	4	10	5½	Withd	rawn
Alldays	England	30	4V	4⅜x6½	G&K	6,720	4500	....	....	....	....	....	....	....	....	....	....	....	....	....
Austin	England	25	4V	3¾x5	G&K	3,140	2300	2900	1950	8¼	3	9	6	0.62	4.1	3	9	6	0.78	2.8
Austin	England	25	4V	3¾x5	G&K	3,140	2300	....	....	....	3	9	6	0.66	4.2	3	9	6	0.79	2.6
Austin	England	25	4V	3¾x5	G&K	3,140	2300	....	....	....	....	....	....	....	....	....	....	....	....	....
Avery	United States	28	4H	4⅝x7	G&K	7,280	5600	4300	3800	12½	3	9	5	0.73	4.3	4	9	6	0.90	4.1
Blackstone (Wheel)	England	25	3V	5 x6½	K	5,300	3000	Not	tested		....	....	....	....	....	....	....	....	....	....
Blackstone (Track)	England	25	3V	5 x6½	K	5,040	5040	3100‡	2300‡	10½‡	3	9	6	0.69	2.8	[3	9	5½	0.64	3.2
Clayton (Track)	England	35	4V	4¾x5½	G&K	6,300	6300	4750‡	3500‡	13½‡	4	9	6	0.81	3.3	4	9½	5½	0.81	[3.4
Cleveland (Track)	United States	21	4V	3¾x5½	G&K	3,250	3250	2300†	1650†	10†	Withd	rawn	....	....	....	3	9	5½	0.54	4.1
Cleveland (Track)	United States	21	4V	3¾x5½	G&K	3,250	3250	....	....	....	2	12	6	0.63	3.6	3	9	5½	0.71	3.5
Cleveland (Track)	United States	21	4V	3¾x5½	G&K	3,250	3250	....	....	....	....	....	....	....	....	....	....	....	....	....
Crawley (Self-contained)	England	30	4V	4½x5½	G	4,600	4600	3100	2300	12½	3	9	6	0.67	3.7	3	9	5½	0.72	2.6
Emerson	United States	25	4V	4¾x5	G&K	5,500	4000	4000	3600	14½	3	9	6	0.57	3.9	3	10	6	0.67	3.0
Eros (Ford Attachment)	England	16.9	4V	3¾x4	G	2,100	1600	2100	1500	8¼	2	9	7	0.53	2.8	2	10½	5	0.49	2.8
F.I.A.T	Italy	25	4V	4½x7⅛	G&K	6,200	4000	5300	3550	12	3	10	5	0.87	3.5	3	10	5½	0.93	2.2
F.I.A.T	Italy	25	4V	4½x7⅛	G&K	6,200	4000	....	....	....	....	....	....	....	....	....	....	....	....	....
Fordson	United States	22	4V	4 x5	G&K	2,900	1800	2200	1500	6¼	2	10	5	0.43	5.7	▲2	10	5½	0.78	3.5
Fordson	United States	22	4V	4 x5	G&K	2,900	1800	....	....	....	2	9	6	0.34	3.9	▲2	9	6	0.61	3.3
Fordson	United States	22	4V	4 x5	G&K	2,900	1800	....	....	....	....	....	....	....	....	....	....	....	....	....
Garner	England	27	4V	4¼x5½	G&K	4,000	2700	2300	1900	14	3	10	6	0.48	6.5	▲	10	6	0.87	4.1
Garner	England	27	4V	4¼x5½	G&K	4,000	2700	....	....	....	....	....	....	....	....	....	....	....	....	....
G. O. (Friction Driven)	United States	30	4V	4½x5¾	G&K	4,250	2800	2300	1900	8	3	10	6	0.38	4.8	3	10	6	0.55	3.7
Glasgow	England	27	4V	4½x5¼	G	4,300	4300*	3550	2800	13	3	10	6	0.54	5.6	3	12	5½	0.70	3.0
Gray	United States	36	4V	4¾x6¾	G	6,300	5000	4500	3800	14½	4	10	6	0.80	4.7	4	10	6	0.86	2.
Illinois (Moseley)	United States	40	4V	5 x6½	G&K	5,400	4000	§	§	§	3	10	6	0.32	8.3	3	10	5½	0.79	§ 3.4
International Mogul	United States	30	2H	8 x12	G&K	11,000	8000	5000	4200	19	4	9½	6	0.61	6.2	4	9½	5½	0.70	4.1
International Mogul	United States	30	2H	8 x12	G&K	11,000	8000	....	....	....	....	....	....	....	....	....	....	....	....	....
International Junior	United States	22	4V	4 x5	G&K	4,050	2600	2600	2150	11½	2	10	6	0.43	4.1	3	10	5	0.64	3.2
International Junior	United States	22	4V	4 x5	G&K	4,050	2600	....	....	....	....	....	....	....	....	....	....	....	....	....
International Titan	United States	25	2H	6½x8	G&K	7,300	5000	4200	2900	14½	3	10	5	0.57	3.7	3	10	5½	0.52	4.1
International Titan	United States	25	2H	6½x8	G&K	7,300	5000	....	....	....	3	10	5	0.55	4.8	3	10	5	0.68	3.2
International Titan	United States	25	2H	6½x8	G&K	7,300	5000	....	....	....	....	....	....	....	....	....	....	....	....	....
Mann Steamer	England	..	2H	4 & 6¾x8	C	12,000	7000	6000	4700	22	4	10	5	0.593	80 lb.	4	10	6	1.08	163 lb.
Martin (Track) (Self-contained	England	28	4V	4¼x5½	G&K	4,500	4500	2500	2050	11	3	9½	6	0.42	7.0	3	9	6	0.42	4.3
Martin (Wheel)	England	28	4V	4¼x5½	G&K	5,700	3500	3300	2700	14½	3	10	6	0.63	5.4	3	10	6	0.60	3.9
Maskell (Self-contained)	England	25	4V	4 x5	G	3,200	2700	Not	tested	....	No	test	....	....	....	2	10	5½	0.46	2.5
Moline (Self-contained)	United States	25	4V	3½x5	G	4,600	3400	2000	1600	9¾	....	....	....	....	....	3	10	6	0.75	2.3
Moline (Self-contained)	United States	25	4V	3½x5	G	4,600	3400	....	....	....	3	10	6	0.47	5.7	3	10	5½	0.48	2.6
Moline (Self-contained)	United States	25	4V	3½x5	G	4,600	3400	....	....	....	....	....	....	....	....	....	....	....	....	....
Omni Tractor	England	35	2V	6½x9	G&K	8,000	5500	4100	3200	17	3	10	6	0.38	4.8	4	10	5½	0.84	5.4
Overtime	United States	28	2H	6½x7	G&K	6,000	4000	3800	3200	15	4	10	5½	0.75	3.4	4	10	6	0.65	3.7
Pick	England	30	4V	4⅜x5	K	5,000	3400	2500	1800	8	Disab	led by	broken	gear	....	3	9	6	0.61	3.9
Saundersen	England	25	2V	5½x8	G&K	5,600	4200	3900	2700	9½	3	9	5	0.49	7.1	4	10	6	0.63	5.2
Saundersen	England	25	2V	5½x8	G&K	5,600	4200	....	....	....	3	10	6	0.74	4.7	3	10	6	0.83	4.8
Saundersen	England	25	2V	5½x8	G&K	5,600	4200	....	....	....	....	....	....	....	....	....	....	....	....	....
Wallis Junior	United States	30	4V	4¼x5¾	G&K	3,400	2600	2600	2300	12½	3	9	5	0.63	3.5	3	9	5	0.73	2.8
Wallis Junior	United States	30	4V	4¼x5¾	G&K	3,400	....	....	....	....	3	9	6	0.63	4.7	3	9	6	0.61	3.2
Wallis Junior	United States	30	4V	4¼x5¾	G&K	3,400	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Week's Simplex	England	30	4V	4¼x5¾	G&K	3,800	2700	2900	2250	9	3	10	5	0.59	3.4	3	9	6	0.61	3.2
Whiting Bull	United States	24	2H	5½x7	G&K	5,600	3200	2300	1700	7	2	10	6	0.41	6.2	2	10	6	0.40	5.4
Whiting Bull	United States	24	2H	5½x7	G&K	5,600	3200	....	....	....	....	....	....	....	....	....	....	....	....	....

ABBREVIATIONS:—*Engine:* H = Horizontal; V = Vertical.
Fuel: G = Gasoline; K = Kerosene; C = Coal. Fuel consumption in U. S. gallons.
*This machine drives through all three wheels.

†Tested without any speeds on tractors.
‡The maximum pull was determined by the engine and no slip took place.
§Test not completed due to clutch slippage.

Road Specifications Must Be Adapted to Truck Needs

The American Road Builders' Association, at its annual convention, recognized the growing need for highways to be constructed to withstand heavier traffic demands. Higher truck speed on pneumatics is not feared and the use of trailers with heavy loads was recommended.

THE motor truck was easily the big factor in the seventeenth annual convention of the American Road Builders' Association, recently held at Louisville, Ky.

The truck stands before the practical road builders to-day as the one thing they must build for, and its traffic is the greatest test of the roads. There was some informal discussion of needed truck legislation. Throughout the session the motor truck came in for comment. The idea of the road builders appeared to be as follows:

The motor truck has become an important industrial feature and must be allowed on the roads. As the road builders see it, the railroads are not and will not be again in position to handle local freight, and the truck must do this. Consequently roads must be built to support the trucks necessary for such traffic.

H. G. Shirley, secretary of the Highway Industries Association of Washington, who presided one day, said that any legislation proposed regarding the motor truck must be constructive and not destructive. This appears to be the idea held by most of the men. Their idea is that specifications for new roadways must demand the construction of roadways that will eliminate the danger from trucks.

Much was said in criticism of recent methods of building roads. The convention attendants were largely road builders, not planners. They complained that roads were made too thin and that, in planning roads, sufficient attention was not given to drainage. As a result, truck traffic destroyed the roads during the frost season, and the builders were often blamed for the results, although they had been hampered by the specifications.

It was made clear in informal conversation that the road builders are not enemies of the truck. Indeed, they will hail it as a friend if the men who draw the specifications would see the necessity of going back to Roman principles in road building. The road builders would rather build good roads than poor ones.

These road builders were not blind to the fact that trucks are turning more and more to pneumatic tires, but they do not see in this any special problem. They do not, as many persons apparently believe, regard higher truck speed as a danger. The thing they see in this connection is that macadam and other roads having a loose top layer must be built with a binder. A higher speed truck will mean a danger to a road that is not compactly built.

While the road builders cannot be said to be opposed to the five- and seven-ton truck, they strongly favor the trailer idea for such heavy loads, and most of them apparently believe that the trailer idea is the coming one for heavy transportation. They do not carry this to the city streets, but they believe that it will be a long time before the rural or even suburban roads will be well enough built to support traffic in the larger single units.

There was considerable discussion as to stronger bridges for truck traffic. In the discussion, however, there was an acceptance of the idea that the truck was the present big factor and that bridges must meet the strain.

A number of the speakers referred to the amount of funds available for road building for this year. The figures most often used before the meetings and which apparently were accepted as correct were as follows:

Roads built last year, $130,000,000.

Roads planned but not built last year, $160,000,000.

Road funds for this year, $650,000,000.

Total for this year, $810,000,000.

All speakers took the view that these figures meant little. The questions they said would affect road production this year are:

The amount of labor and its willingness to work.

The amount of material delivered to jobs by the railroads.

One speaker, a large contractor, predicted that production would not be greater this year than last. He rather feared that it would be less. He said, and he was well supported in the view, that the amount of money available was the least important factor.

An interesting discussion arose over the question of types of roads upon which Federal Aid money should be expended. The road builders took the view that this money should be paid on any work well done. H. K. Bishop, Chief Highway Engineer of Indiana, said that, when connected with the Federal Road Bureau, he had criticized the prospect of an allowance for a dirt road. His attention was then called to the fact that foundation and culverts of the road were well planned and would meet the most severe requirements. Then the person answering his criticisms said: "If a road foundation is not the permanent factor, I do not know what is. The best road surface and shoulders will wear away in time, but a good road foundation is always there." Holding to this view, the road builders apparently approved of the suggestion to devote Federal Aid to good foundations, whether furnished with cheap or expensive materials. They apparently do not approve of any surface between "sand, clay or gravel" and "standard paving," but the most important is the foundation.

There was an interesting exhibit of road building machinery and trucks and tractors were about equal to the specialized road machines. Especially were truck dump bodies plentiful. The truck men had this complaint: "We have not attracted much attention here. These men know the truck usefulness in roads too well, and they do not pay much attention to anything except a new idea in bodies."

The Case of the Employee Who Does Not Strike

The claims for consideration of the salaried worker and the employees who have not forced their demands through organization and walk-outs, are presented in this week's article by Mr. Tipper. The employer is urged to meet his labor problems upon a basis of intelligence and study.

By Harry Tipper

THE other day at a meeting of salaried workers supervising their own departments and carrying the whole responsibility of important branches of their business, some pertinent questions were put to me after a speech on the subject of labor which were indicative of the train of thought which is occupying the intelligent worker of this type. I am not putting these questions down in the order in which they were received, but in the order in which they correlated themselves for reply.

The first question which was asked was: "Isn't it true that the organized power of labor and its ability to interrupt work has been the principal reason for the development in its economic condition?" This question was also stated in the following way: "It is admitted that the salaried worker has not secured an increased reward in proportion to the manual worker, yet his responsibilities are frequently greater and his training longer and more costly. Isn't it true that this is due to the lack of organization?"

The third question resolved itself into something like this: "It is obvious from economic study that what we need is more production and, in order to have more production, we must continue to work and to work a little harder, but we see ourselves left out to some extent in the rewards because we have not interrupted production. How are we going to change this?"

This has a direct relation to the report of several thousand manufacturers to the historical division of the Quartermaster's Office in Washington. When they were asked about labor difficulties, most of them replied they had no trouble, as their men had not struck.

So long as a manufacturer continues to sleep peacefully under the impression that there is no trouble until a strike occurs, so long will he put a premium upon the interruption of industry by strikes and pay higher wages, not because of greater production, but because of the interruption to production which has occurred. Until the manufacturer is willing to study the work which has to be done in his plant in all departments, without regard to the power of labor organizations in those departments, and without respect as to how the workers are paid, there will be a distinct and direct encouragement to all workers to organize so that they will have sufficient power to compel attention from the manufacturer.

We are continually deluded in our estimate of the worker's economic position, by the average rate of pay and the average condition of the worker in that industry, so that we fail to recognize the fact that, in the case of labor, averages do not count with the worker and the fact that some departments of the business have increased in their pay more rapidly than the increase in the cost of living, only increases the dissatisfaction of the worker who happens to be in a department of the business which has not increased in its rewards in any such proportion. For instance, it was noted in AUTOMOTIVE INDUSTRIES of Jan. 15, in a statistical article on labor conditions, that in the iron-steel industries, the earnings of rollers in plate mills had decreased 5 per cent since 1914 while the average increase in the industry was 126 per cent and, similarly in the coal mining industry, the general increase average was 38 per cent while the wages of greasers and couplers in this particular field had increased 133 per cent. Furthermore, there is a disparity between the rate per hour and the average earnings in any line of work in almost any industry. In many lines of business this disparity is of great importance because of the intermittent character of the work.

Of course, this question of the neglect of industrial trouble until it finds its culmination in a strike, and therefore, puts a premium on warfare and interruption of production, is allied to the question of the wage system.

The wage system has been referred to previously in these articles, and the absurdities of its development have been suggested. These absurdities are increased by the neglect of those employees who continue to be loyal to their work, who do not organize to enforce their demands and who do not attempt to bring attention to their necessities by the interruption of production which is so sorely needed.

Statements have been made from time to time as to the growth of socialism in the ranks of teachers, professors and even engineers. It is obvious that where the occupation requires a great deal of preparation and training and demands a continual study, the failure to reward that occupation in a measure reasonably commensurate with its responsibilities plus the continual neglect of its loyalty and intelligence, will emphasize the deficiencies of the present system of industrial organization and induce the practitioners in such occupation to turn a receptive ear to other theories and their allurements. It must be remembered that occupations which demand more judgment, a higher degree of training and more study result in a mental development which is bound to react against injustices of the present system.

The longer it is customary to neglect labor trouble until it shows itself in strikes and the longer it is customary to reward only those who have the power to strike, the more will be the apparent justification for the creed of the Socialist and the more the middle class intelligent worker can be expected to study it.

There is evidence in the attitude of the American Federation of Labor and similar bodies that the right to strike is considered as their most important weapon and the attempt to question that right the most dangerous which has been put forward, from their standpoint. This emphasis on the importance of the right to strike arises out of the neglect of the manufacturer to consider the economic position and the training required in skill and accomplishment where the worker is not in a position to cause him any embarrassment. It is the attitude that is left over from the commodity theory of labor and the supply and demand practice of it. This theory and this method ought to have been pretty thoroughly exploded by the events of the last two years, but the attitude of manufacturers in general toward the labor situation does not indicate any such development toward a better understanding.

Apparently in the minds of the majority of these manufacturers, labor, as a term, embraces only those workers who are organized sufficiently to bring embarrassment, and labor trouble relates only to the interruption of production by such labor. Even the production engineer who has attempted to reform the wage system by mechanistic theories as to motions and expended energy has not realized that production is a matter of psychology first, that labor trouble exists as a subconscious resentment long before it becomes a conscious irritation and that it is a conscious irritation long before such irritation becomes sufficiently intense to demand organization and the interruption of one's work.

The manufacturer does not seem to have taken into account the fact that the great fear of being jobless is subconsciously in the background in the case of 75 per cent of the workers at all times. No less so is the salaried man who has larger responsibilities of supervision than the subordinate whom he supervises. This fear is sufficient to keep any subconscious resentment from appearing on the surface except under conditions of severe stress and it will prevent the individual from voicing his conscious irritation until that irritation becomes unbearable. It is only when the workers have organized and are accorded the necessary courage by the combined action that the strike is approached with equanimity or that the worker shows any tendency to voice his dissatisfaction.

I have made the claim many times that I could go into 90 per cent of the industries of this country and find resentment among the salaried workers in from 30 to 50 per cent of the individual cases, and that such resentment would be entirely unknown to the supervisors and managers—and probably unbelieved when it was spoken about.

In an address before the National Civic Federation, Henry A. Wisewood, who seemed to have a very bitter feeling for the Socialist, said that it was not the foreigner, but the intelligent American leader whom he considered dangerous in connection with the progress of the Socialistic creed. In a report before the American Institute of Mining and Metallurgical Engineers, T. T. Read, in discussing some investigations into the mental status of the workers, found that in several cases the leaders, and especially the radical leaders, showed the most intelligence in response to tests. These things are true; only the statements are somewhat too conservative. It is the worker of intelligence who will think out mercilessly the conditions of industry as he sees them and his thinking will be colored by his subconscious sense of injustice, by his conscious resentment and by his irritation against the deficiencies and inequalities of the system.

I do not believe that there is much to be afraid of in the Socialistic tendencies of the undigested foreign population, but the intelligent supervisor, the middle class worker who is capable of independent thought and accustomed to using his judgment, will, if his mind is turned that way by his constantly growing irritation against the present injustices, put a leadership, a backbone and a punch into the revolutionary schemes which will put them in an entirely different category, and will demand an attention they do not need at the moment.

These things argue the necessity for the manufacturer's consideration of the conditions of his employees in all departments without reference to whether they are organized or not and without reference to whether they are paid on piece work, on time work or by salary arrangement. It points to the necessity for the careful and patient establishment of sufficient confidence in the management of the concern so that the manufacturer can be assured that any dissatisfaction will be voiced and not kept under cover until it has grown into the fierce resentment which calls for action. It also calls for the recognition of the fact that so long as attention is confined to those troubles which have become proposed strikes, a premium is placed upon the interruption of production as a means of calling attention to the worker's demand and justifies the strike as nothing else could justify it.

There is not a labor leader of my acquaintance who cannot justify the use of the strike by his record of the results which have been obtained by it, and his evidence of the fact that nothing else will sufficiently attract the attention of the management.

This situation must be changed and it must be changed by recognition on the part of the management that grievances are always personal long before they become general and they are usually general long before they become visible. This recognition of labor trouble, only when it becomes a strike, however, has an influence in other ways. It constantly emphasizes to the worker the fact that industrial relations are the result of advantage and to be secured only by power. It constantly minimizes the justice of the case where it does not eliminate the idea entirely.

Years of union progress have so imbued labor leaders with this conception of industrial relations that they hardly conceive of any management which does not approach the labor question from this standpoint. They are so accustomed to lose or win according to the advantage they possess, or do not possess, and they are so accustomed to apply force in order to get a hearing that they do not believe there is any justice in industrial relations between management and worker and they do not act, therefore, in accordance with any such belief.

Time after time in the last year, I have heard manufacturers complain that labor was unjust in its demands and I have replied that the manufacturers spent many years teaching labor the injustices of business; by neglecting all labor which did not exercise its power to organize and force this power upon the manufacturer by strike or the threat to strike.

In a recent article it was stated that the average worker subconsciously or consciously recognized that he is not a leader, and must follow a leader. For that reason it is of the utmost importance that he should have faith in the justice of the leaders and his allegiance to his labor union or his labor organization arises out of his belief in the labor leader and his suspicion of and lack of belief in the management of industry.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

PUBLISHED WEEKLY
Copyright 1920 by The Class Journal Co.

Vol. XLII Thursday, February 26, 1920 No. 9

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Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

The Future of Tractor Shows

THERE seems to be much difference of opinion in the industry as to the best way of handling the tractor show problem. Kansas City has had five shows in as many years; it is generally admitted that they have been well managed, and the way in which the number of exhibitors and the floor area covered by exhibits have grown from year to year is pretty good evidence that exhibitors as a rule have been benefited.

The spirit of unrest among the leaders of the N. I. & V. A., who are in control of show arrangements, is probably in part due to the decision to entirely discontinue national tractor demonstrations. It is felt that in the summer and fall the farmer is too busy to take off the time necessary to attend these demonstrations. The winter is the farmer's vacation period, and whatever propaganda the tractor industry plans should be carried out during this season of the year.

The large tractor manufacturing concerns naturally desire to cover the whole country in their selling campaigns, and now that national demonstrations have been suspended, it is most important that the influence of the show be extended to cover the whole country. Despite its name, the Kansas City show has never been a truly national show. It is the attendance and not the list of exhibitors which determines the character of a show, and the attendance at Kansas City has always been very largely from the surrounding States; the number of visitors from east of the Mississippi, for instance, being insignificant. But it is very likely that no matter in what city it were held, a single show could not adequately cover the entire country.

Some cities would be better exhibition centers in that they are more accessible to the majority of the exhibitors. Kansas City is at a disadvantage in that it has no suitable exhibition building and that its hotel accommodations at the present are inadequate, though this latter deficiency is in the way of being remedied. The two things it has in its favor are that it is the natural distribution center of the greatest tractor-using section of the country and that it has successfully conducted five annual tractor shows, each of which has been an improvement over the preceding one.

Although there were several meetings of the N. I. & V. A. at Kansas City at which this problem was discussed, no decision was reached, and it will be considered further at a meeting to be held in Chicago on March 9. Two proposals seem to be under consideration, one being to hold a single national show either at Chicago or Kansas City, the other to hold a number of regional shows, as at Minneapolis, Kansas City, New York and in some city on the Pacific Coast. In view of the poor outlook for a truly national show the regional plan is likely to be adopted. The Kansas City experience has proven that even large tractor dealers will not travel half way across the continent to attend a show, not to mention the small dealer and the farmer.

The Ex-Service Man

THE United States Government is doing many things to care for the men who served in the fighting forces during the war. The services are varied in character but uniformly beneficial to the discharged service man. The value and the opportunities offered by these various services are not thoroughly understood by the majority of discharged service men, and as a result many of them are spending their own money for things that the Government is willing to provide for them free of charge or at greatly reduced rates.

The Public Health Service, for instance, has set up a chain of reconstruction bases throughout the country for beneficiaries of the War Risk Bureau. These are not army hospitals but a system of hospitals similar to the general hospitals in large cities, except that the treatment is free and goes much farther than the ordinary hospital, and it is unnecessary for the ex-service man to risk inferior treatment at his expense.

The personnel directors in every manufacturing plant may render a real service to employees by conveying to them the details and advantages of the

different Government services for discharged men. Full information may be obtained from the various Government departments concerned, and the personnel director can then interpret and assist his men in receiving all the benefits to which they are entitled.

Plowing Speeds

ONE of the "livest" topics in the tractor industry is that of the best speed for plowing. The question is whether it is more advantageous, everything considered, to plow at slightly over 2 m.p.h. or to plow at between 3 and 4 m.p.h. The S. A. E. standard plowing speed is 2 1/3 m.p.h. and most of the older makes of tractors are designed for about that rate. On the other hand, there are two or three tractors—and these among the most prominent makes on the market—which plow at about 50 per cent faster.

It can hardly be denied that good plowing could be done at either speed and that the quality of the work—provided the tractor has enough power—is chiefly dependent upon the design of the plow. Admitting, then, that equally good work can be done at both speeds (though it will not necessarily be equally good if the same plow is used) the question narrows down to one of cost. Is the total cost of plowing an acre greater under high speed or under low speed conditions?

In making a comparison of this sort, it seems logical to make it between a low speed 3-bottom and a high speed 2-bottom plow, because both of these would require about the same size of engine and because the first cost should be substantially the same if quality of materials and workmanship were the same. Because of the many items in the total cost, it is not possible to make a conclusive comparison, but it is possible to determine in what way the result would be favorably influenced by an increase in speed and in what way the higher speed would be detrimental.

In the first place, it has been shown by experiments of Professor Davidson that it takes more horsepower hours to plow an acre at high speed than at low speed. The mechanical work done upon the plow per acre plowed is therefore greater in high speed plowing, the increase being about 10 per cent for an increase in speed from 2 1/3 to 3½ m.p.h., to judge by Professor Davidson's results.

The chief advantage of the higher plowing speed is that the tractor need not be as heavy, because the minimum weight on the drivers is directly proportional to the maximum drawbar pull required and the total tractor weight the same. However, the weight cannot be reduced in the proportion of 3 to 2, partly because the drawbar pull will not be reduced in that proportion and partly because it might be too expensive to cut the weight to that extent. As the high speed tractor has to travel 50 per cent farther in plowing a certain acreage the work done in moving the tractor itself, in plowing, say, one acre, is also greater for the high speed tractor.

The reduced weight of the high speed tractor would be considered an advantage in itself by the farmer, as he would expect less packing of the soil. However, the packing of the soil depends upon the pounds per square inch of ground contact area and, as the high speed tractor is likely to have narrower wheel rims, this factor may be substantially the same for both.

The high speed tractor is a better manufacturing proposition, because the gear reduction from engine crankshaft to drive wheel is materially less and may possibly be accomplished with one less set of gears. This would mean weight economy, manufacturing economy, greater efficiency of transmission and simpler construction.

Probably the best thing that can be said for the high speed tractor is that, on account of its light weight, it is better suited to some of the other classes of work on the farm requiring less draft than plowing. For plowing in rough or rocky soil, the high speed machine is certainly at a disadvantage and, in almost any soil, the wear and tear on the plow would be expected to be materially higher at high speed.

It will be seen from the above that the advantages are by no means all on the same side and that no *prima facie* case can be made out for either type of machine. The case will probably have to be carried to the court of last resort—the farmer and the plowman.

Roads and the Motor Truck

THE motor truck manufacturer will do well to keep in touch with the various road promotion associations, if the recent convention held by the American Road Builders' Association is a criterion of what road builders are thinking and talking.

Trucks, of course, will never develop their full usefulness until the roads are equal to traffic strains. The road builders have some ideas of their own about what this strain should be. They are willing to go as far as they can toward preparing the roads for this strain, but it was evident from their talk that they would like some help from the manufacturer.

It did not develop at the meeting that the road builders are other than friendly to the truck, and they recognize its great possibilities as an industrial factor. They are willing to help bring it to its big field of usefulness, but they feel that they should have help in bringing the public to a realization that roads must be well built to meet the strain. Also they believe that truck manufacturers and salesmen could help the situation by recognizing present conditions in recommending trucks for particular jobs.

Index for Vol. XLI

AGAIN we call your attention to the fact that we were compelled, by printing conditions, to change the arrangement of publishing the index for the last volume of AUTOMOTIVE INDUSTRIES. Instead of printing the index as a part of a regular issue, the index is being printed separately and will be distributed by request. If you have not asked for your copy, send in your request to-day.

Champion Victim of Spark Plug Swindle

Discovers Market Has Been Flooded Four Years With Spurious Product

CHICAGO, Feb. 26—The Federal dragnet is closing on a band of swindlers whose operations are said to have defrauded the Champion Spark Plug Co. of Toledo and its customers out of at least $1,000,000 in the past four years.

The swindlers are alleged to have produced a spark plug so closely imitating the genuine product in appearance that some plugs which were sent to the factory as defective were replaced with new ones. However, close examination revealed the fact that these spurious products were made of inferior materials which enabled the swindlers to undersell the regular salesmen and jobbers. In fact, so cleverly were the sales handled that agents of the Champion company often were accused of profiteering when they tried to place their goods at the regular factory prices.

These bogus plugs are said to have been on the market in large quantities. When the suspicions of the company were aroused several months ago they set detectives on the case. So cleverly were the sales of the spurious plugs handled that it was not until $50,000 had been expended and hundreds of clues had been run down that an arrest was made.

The man was William A. Bentley, who is believed to be only a minor employee of the operators. However, his revelations have placed under suspicion several other men who are expected to be brought before the court as conspirators in the swindle, and it is hinted that the ultimate development of the swindle investigation may involve several wealthy Chicagoans.

The case is docketed for trial before Judge Landis.

NAME "GOOD WEAR" BARRED

WASHINGTON, Feb. 20—The Good Wear Tire & Rubber Co., of Chicago, Ill., has been instructed by the Federal Trade Commission that it must refrain from using its name or any name calculated to simulate the name of the Goodyear Tire & Rubber Co. It must also refrain from cementing and sewing together two second-hand tires described as double tread and selling these without the use of other words to show that these tires are not made from new and unused material but are reconstructed.

NEW BUICK SHIPPING HEAD

SAGINAW, MICH., Feb. 19—A. R. Merrick, superintendent of the Toledo-Ludington division of the Père Marquette, has resigned to become transportation superintendent for the Buick Motor Car Co., at Flint, Mich.

DOUGLAS PRICES RISE

OMAHA, NEB., Feb. 21—Prices on Douglas trucks, manufactured by the Douglas Motors Corp., have been advanced to the following rates: One-ton, $1,790; 1½-ton, $2,175; 2½-ton, model E, $2,750; 2½-ton, model F, $3,025. The prices quoted are chassis prices equipped with solid tires.

Employee Increase Shown in January

Thirty-Six Factories Employ 5 Per Cent More — Wages Rise 12.4 Per Cent

WASHINGTON, Feb. 20—Wages in the automobile industry for January, 1920, as reported by thirty-six manufacturers to the Department of Labor, shows $3,617,749 paid to 107,559 employees, as compared with $2,091,674 to 73,126 employees in January, 1919. This shows an increase in wages amounting to 73 per cent as compared with an increase in the number of employees of 37 per cent.

An increase was also noted in the comparison between January, 1920, and December, 1919. In January, 1920, thirty-seven establishments reported a payroll of $3,553,941 for 105,053 employees, as compared with December figures showing $3,161,276 for 100,098 employees. This shows an increase in wages for January over the preceding month amounting to 12.4 per cent, while the numbers employed increased 5 per cent.

Surveying thirteen industries, the Department of Labor found that in ten there was an increase in the numbers employed, while in three there was a decrease, the greatest increase being in clothing and woolen, with the largest decrease in car building. Eleven of the industries show an increase in the payrolls. The largest increase in the numbers employed for January as compared with December appears in the iron and steel trade. Comparisons of employment and wages are shown in the tables below.

Comparison of Employment in January, 1919, and January, 1920

Industry	Estab'mts reporting for Jan. both yrs.	Period of pay-roll.	Number on pay-roll in January 1919	Number on pay-roll in January 1920	Per cent of increase (+) or decrease	Amount of payroll in January 1919	Amount of payroll in January 1920	Per cent of increase (+) or decrease
Automobiles	36	1 wk.	78,126	107,559	(—)			(—)
Boots and shoes	65	1 wk.	51,624	56,610	+37.7	$2,091,674	$3,617,749	+73.0
Car building and repairing	55	½ mo.	66,766	50,109	+ 9.7	1,110,203	1,395,794	+25.7
Cigars	56	1 wk.	18,273	17,492	—24.9	3,887,252	3,050,049	—21.5
Men's clothing	36	1 wk.	13,314	20,530	— 4.3	291,278	365,467	+25.5
Cotton finishing	17	1 wk.	12,762	15,868	+54.2	267,892	668,517	+149.5
Cotton mfg.	52	1 wk.	43,532	45,341	+24.3	241,367	398,024	+64.9
Hosiery and underwear	65	1 wk.	30,709	34,182	+ 4.2	709,333	945,075	+33.2
Iron and steel	97	½ mo.	191,486	174,797	+11.3	442,355	647,200	+46.3
Leather	33	1 wk.	15,449	18,025	— 8.7	13,250,085	12,378,710	— 6.6
Paper	50	1 wk.	27,588	28,734	+16.7	339,439	466,443	+37.4
Silk	49	2 wk.	17,787	21,099	+ 4.2	596,765	747,149	+25.2
Woolen	49	1 wk.	29,123	43,975	+18.6	626,094	957,632	+53.0
					+51.0	507,700	1,146,242	+125.8

Comparison of Employment in December, 1919, and January, 1920

Industry	Estab'mts reporting Dec. and Jan.	Period of pay-roll.	Number on pay-roll in Dec., 1919	Number on pay-roll in Jan., 1920	Per cent of increase (+) or decrease	Amount of payroll in Dec., 1919	Amount of payroll in Jan., 1920	Per cent of increase (+) or decrease
Automobiles	37	1 wk.	100,098	105,053	(—)			(—)
Boots and shoes	59	1 wk.	51,492	52,123	+ 5.0	$3,161,276	$3,553,941	+12.4
Car building and repairing	55	½ mo.	51,443	50,109	+ 1.2	1,287,310	1,323,272	+ 2.8
Cigars	56	1 wk.	18,288	17,663	— 2.6	3,258,785	3,050,049	— 6.4
Men's clothing	44	1 wk.	17,704	17,981	— 3.4	399,345	368,363	— 7.8
Cotton finishing	17	1 wk.	16,020	15,868	+ 1.6	543,347	575,283	+ 5.9
Cotton mfg.	52	1 wk.	43,772	43,506	— 0.9	403,807	398,024	— 1.4
Hosiery and underwear	61	1 wk.	32,012	32,097	— 0.6	895,684	910,103	+ 1.6
Iron and steel	99	½ mo.	158,067	177,674	+ 0.3	594,328	609,071	+ 2.5
Leather	31	1 wk.	16,926	17,238	+12.4	11,099,167	12,615,643	+13.7
Paper	50	1 wk.	28,458	28,734	+ 1.8	432,517	443,736	+ 2.6
Silk	47	2 wk.	20,067	20,178	+ 1.0	731,641	747,149	+ 2.1
Woolen	49	1 wk.	45,553	47,407	+ 0.6	918,390	916,316	— 0.2
					+ 4.1	1,184,265	1,227,862	+ 3.7

Autocar Company Fights High Rents

Warns Realty Men It Will House Employees Unless Given Fair Treatment

PHILADELPHIA, Feb. 25—The Autocar Co. of Ardmore, Pa., is fighting rent and realty sales profiteering, prevalent in Pennsylvania, in an unusual manner, because it is faced with a serious housing proposition for the employees of its growing plant. It is inserting quarter-page display advertisements in the Philadelphia newspapers, worded as follows:

"TO PROPERTY OWNERS OR THEIR AGENTS:

"Overbrook, Merion, Cynnyd, Gladwynne, Narberth, Wynnewood, Ardmore, Llanerch, Oakmont, Haverford, Bryn Mawr, Rosemont, Wayne:

"All of your communities are handy to our already large and rapidly growing plant.

"We are faced to-day with an unusual condition. Our people are in the market for a considerable number of houses, both large and small, with or without garages. Both the quoted prices of those that have been brought to our attention are, we believe, excessive.

"Shall we be compelled to build houses, and go into direct competition with property owners of this section—or can we find houses for our men already built, at reasonable prices, or at reasonable rental, leases to run one or more years?

"What have you for sale or lease that will meet the housing needs of those connected with our company, where steady work prevails? Please communicate with E. A. Fitts, vice-president.

"THE AUTOCAR COMPANY.
"Ardmore, Pa."

Trade Opportunities in Foreign Markets

WASHINGTON, Feb. 21 — The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

A commercial agent from Bulgaria is in the United States for the purpose of making business connections with manufacturers only, with a view to securing an agency and purchase fifty tractors and other machinery. References. 32042.

A merchant in India desires to secure an agency and purchase bicycles, motorcycles and accessories and motor accessories. Quotations should be given f.o.b. Bombay. Payment through bank in Bombay. References. 32044.

An agency is desired by a man in France for the sale of motor tires and tubes and all articles for the automobile and pneumatic trade. Quotations should be given c.i.f. Bordeaux. Correspondence may be in English. References. 32050.

An agency is desired by a merchant in France for the sale of automobiles and trucks. Quotations should be given c.i.f. St. Nazaire or Nantes. Correspondence should be in French. Reference. 32058.

The president of a commercial organization in Bulgaria desires to purchase and secure an agency for 2-ton motor trucks. Correspondence may be in English. Reference. 32060.

Contractors for supplies for Government departments and manufacturers' representatives in Egypt desire to enter into business relations with manufacturers on a commission basis to purchase and also secure agencies for the sale of bicycles and motorcycles. Payment by letter of credit in American bank against documents. References. 32071.

A merchant in Italy desires to secure an agency and purchase leather for automobiles, bicycle accessories and spare parts and tires for automobiles and bicycles. Quotations should be given c.i.f. Italian port. Correspondence may be in English. Reference. 32086.

PERFECT DENBY PLANS

DETROIT, Feb. 19—Reorganization of the Denby Motor Truck Co., as was outlined briefly in the last issue of AUTOMOTIVE INDUSTRIES, in line with plans of the creditors' committee named to take charge of the concern in December, resulted in the election of A. S. More to succeed Garvin Denby as president. Denby's resignation was handed directors at the annual meeting this week when More, who is a protege of C. H. L. Flintermann, vice-president and general manager of the Detroit Pressed Steel Co. and chairman of the creditors' committee named to handle the Denby refinancing program, took charge. Other officials are Maj. Edwin Denby, first vice-president; T. M. Simpson, second vice-president; M. H. O'Brien, secretary; E. R. Ailes, treasurer, and H. T. Carpenter, assistant secretary and treasurer.

MAY IMPORT PLATE GLASS

CHICAGO, Feb. 20 — Negotiations have been entered into with Belgian manufacturers of plate glass, by the William R. Johnson Mfg. Co., in the hope of getting a sufficient supply for its curtain window and windshield wing production. General information on the plate glass industry is that the production in 1920 will just about equal the shortage in the supply demanded by manufacturers.

FORD CARBURETERS

DETROIT, Feb. 20—Announcement in December that Holley carbureters were being installed on its cars by the Ford Motor Co., gave rise in some quarters to the impression that the Holley product was being used exclusively. As a matter of fact, Holley and Kingston carbureters are being used in about two-thirds and one-third ratio.

British Cars Near Quantity Production

Exports Show $15,000,000 Increase Over 1918 and $3,321,325 Over 1913

LONDON, Feb. 6 (*Special correspondence*)—Analyzing the Board of Trade returns for 1919, the American Chamber of Commerce in London considers the British motor industry to be in a favorable position as regards its future development. Taking the normal rate of exchange as a basis—in other words, the approximate rate at which these exports would have been valued had they come from the United States—the exports of the automobile industry of the United Kingdom for the year 1919 are as follows:

Cars and chassis.....	$7,630,480
Tires and parts.....	12,109,530
Car parts.....	5,375,390
Total export value.....	$25,115,400

Britain's exports of automobiles for 1919 show, roughly, an increase of $15,000,000 over those of 1918, and an increase over 1913, the last pre-war year, amounting to $3,321,325, when the total automobile exports reached $21,794,075.

In making this comparison with 1913, the American Chamber draws attention to the part played by the depreciated value of sterling exchange in the above increase. In view, however, of the industrial troubles of 1919 which have had a hampering effect on the British motor industry, the British export figures may be taken, on the whole, as indicating a big expansion in the near future.

According to the Board of Trade returns, the values of automobiles imported into the United Kingdom in 1919 are:

Cars and chassis.....	$10,246,040
Tires and parts.....	10,267,115
Car parts.....	15,504,705
Total import value.....	$36,017,860

Imports Under 1913 Figures

This total of $36,017,860 is, roughly, an increase of nearly $10,000,000 over 1918, the last year of war; but, on the other hand, the figures represent a decrease in imports over 1913 of $1,036,355, in which year the total automobile imports into the United Kingdom were $37,054,215.

In any summary of Britain's automobile import trade for 1919, it must be borne in mind, says the American Chamber, that the value of the cars imported into Great Britain from the United States, for instance, in 1918-1919, would necessarily be a good deal inflated owing to the downfall in sterling exchange.

An interesting factor in the actual British car production, says the Chamber, is the combination of automobile firms representing a capital of $20,000,000—known as the Angus-Saunderson—which has delivered 216 cars since 1919, or, roughly, 100 per month. The estimate made by these British motor-car manufacturers gives a production of 7,000 cars for the period ending October, 1920.

Restore Rates of Canadian Exchange

Lexington and Moon Will Absorb Difference in Exchange at Once

TORONTO, Feb. 21—Two of the prominent United States motor car manufacturers have taken the bull by the horns and turned him out of the Canadian china shop—in other words, both the Lexington Motor Car Co., for which the Lexington Motor Sales, Ltd., is distributer for Ontario, and the Moon Motor Car Co., for which the Moon Motor Sales, Ltd., is distributer, have decided to absorb the exchange accepting Canadian funds at one hundred cents on the United States dollar.

Other United States motor car and truck manufacturers, it is expected, growing impatient with the lack of success that has attended the efforts of the National Automobile Chamber of Commerce to circumvent the exchange barrier by Canadian banking or the establishment of long term credits, will not be long in emulating the example.

It does not follow, however, that the Canadian trade has abandoned hope in the good offices of the N. A. C. C. representing as they do the concerted efforts of the United States automotive manufacturers or that they will not eventually be crowned with success. Meanwhile, some of the prominent Canadian distributers of motor vehicles imported from the States have suspended their orders for motor vehicles from the States and at least one has returned cars shipped by refusing to take delivery here.

By mail comes the announcement from S. C. Johnson & Son, of Racine, manufacturers of automobile specialties, that the firm has secured a "factory site at Brantford, Ont." where it will construct its Canadian plant and manufacture its full line of products. Meanwhile, having opened an account with the Bank of Montreal, it is "absorbing the exchange on all Canadian business."

Some time ago the president of Automobile & Supply, Ltd., Toronto, received a letter from the Standard Rarts Co., of Cleveland, advising him that that company would accept Canadian funds at par till further notice, and the Howard Deflector Co., of Detroit, has just advised the trade that pending the erection of purchase of a plant in Toronto it will absorb exchange on all Canadian business.

So "things" are moving apace already, and in the right direction, with every prospect of gaining momentum rapidly.

TO MAKE NEW UNIVERSAL

WEST BEND, WIS., Feb. 23—The Carl Pick Co. is being organized with $75,000 at West Bend, Wis., to establish a plant for the manufacture of automotive parts, specializing in a new design of universal joint invented and patented by John Wittemann of Milwaukee. Carl Pick of West Bend is the leading spirit in the enterprise. The former plant of the West Bend Aluminum Co. has been taken over and will be equipped as a plant.

Pushing a Plow Is a Snap for This Tractor

The Midwest Engine Co., Indianapolis, used one of the products of its factory—a Utilitor—to supply power to push a snow plow after the recent blizzard. This unusual adaptation of a farm tractor demonstrated that the Utilitor was well named. One of the factory hands is shown here guiding a plow propelled by a Utilitor

Headlight Glare Arouses Complaint

Government Committee Would Limit Light Pending Dimming Device Perfection

LONDON, Feb. 6 (*Special correspondence*)—American firms doing business with Great Britain will be interested in noting that a just issued interim report by a Government departmental committee on the lighting of road vehicles declares that far too powerful headlights are in common use on the roads, that they fail to give a safe light, and cause much waste of light; that "no satisfactory dimming device to avoid dazzle has yet been discovered" and that pending a discovery of a satisfactory device a maximum power light standard should be fixed, and reflectors should be limited in size varying with the power of the light.

Considering that practically all American cars received here are standardized with frosted and corrugated lenses, and some with lowered lenses, the effect of which undoubtedly is in the direction emphasized as necessary, it is curious that no reference is made to the value of these devices, and that the report should so emphatically state that nothing practical and satisfactory exists for the purpose.

It is true that until lately British lamp makers seemed rather to aim at providing excessively powerful and unfenced lamps, and that the first efforts to control glare by a European maker is owed to Bleriot of France, and before him to the Autoclipse Co. of America. It seems either a trifle ungenerous regarding later efforts, or evidence of ignorance of the comparative success of the later American frosted lamps, for the report to dismiss the matter so directly.

It points to some preference of the committee for mechanical devices of the shutter type, which the average user won't have, or to the view that road pace must be controlled, and that the most effective means to that end is by permanently controlling light, which also is a course not likely to be approved by motorists. ENGLISHMAN.

ERECT POWER HOUSE

MILWAUKEE, Feb. 23—To provide an electric current supply for the rapidly increasing number of automotive industries locating in Milwaukee and suburbs, the Milwaukee Electric Railway & Light Co. is beginning work on the first unit of a new steam generating plant costing $7,500,000 at Lakeside, between St. Francis and Cudahy, on the shore of Lake Michigan. The first unit will cost $500,000 and will be ready about June 15. One of the principal consumers will be the new four-cylinder passenger car works of the Nash Motors Co., Kenosha, at the southern city limits of Milwaukee, which will commence quantity output within a short time.

Siam Market Held by American Cars

Only Nine Cars Imported in 1919 Made in Other Countries

WASHINGTON, Feb. 20—Twelve hundred and nineteen motor cars have been shipped to Siam within the last 10 years, according to reports received by the Bureau of Foreign and Domestic Commerce. Of this number 122 were imported from the United States during the first five years and 495 in the last five years. There are more than 1200 licenses issued for motor vehicle operation, but the actual number of automobiles in daily use does not exceed 800. Most of these cars are privately owned. Comparatively few trucks are employed, owing to the cheaper cost of transportation by water.

During the last five fiscal years American motor cars have practically dominated the Siamese market in spite of the fact that owing to lack of direct shipping facilities between Siam and the United States, their import was greatly hampered during the war by certain trans-shipment regulations at the ports of Singapore and Hongkong.

In the fiscal year ended March 31, 1919, the United States supplied 161 cars out of total import of 170 cars, 4 being supplied by the United Kingdom, 1 from Singapore, 1 from the Dutch Indies, and 3 from Hongkong. The aggregate declared import values during the respective periods were: 226,727 ticals in 1916; 519,845 ticals in 1917; 328,264 ticals in 1918, and 507,599 ticals in 1919. (A tical at normal exchange equals $0.3709 United States currency.)

Practically without exception the American motor cars shipped to Siam up to the present time have given entire satisfaction to their users. The success of the United States in this trade is largely due to the careful attention given by American manufacturers and exporters to the requirements of this market and to the frequent and very essential visits made by expert representatives. The benefits to the trade resulting from such visits cannot be too strongly emphasized in this as well as in other lines of business. Motor vehicles are not manufactured in Siam. As in former years the import duty remains 3 per cent ad valorem.

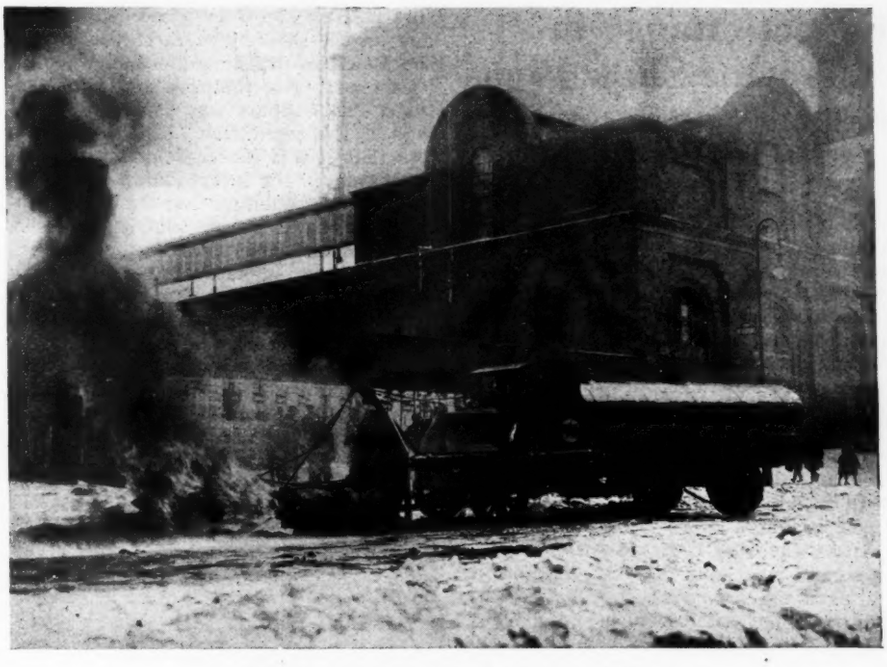
BUYS PONTIAC FARM LAND

PONTIAC, MICH., Feb. 19—Calumet Land Co., of Detroit, which is composed of officials of the Hudson Motor Car Co., has purchased six farms, totaling 858 acres on Auburn avenue, along the Michigan airline tracks. The consideration was not announced, but is said to run well into the hundreds of thousands.

Kenneth McKenzie, assistant president to Roy D. Chapin, president of the Hudson Motor Car Co., and an official of the Calumet Land Co., said to-day there was no significance in the purchase of the property, in so far as the Hudson was concerned.

The company was in no way connected with the negotiations, he said, and declared it was a personal matter and strictly an investment.

The Calumet Land Co. is capitalized at $100,000 and is incorporated under Michigan laws. Besides Chapin and McKenzie, Howard E. Coffin, vice-president of the Hudson Motor Car Co., is named as an official of the land company.



A Monster Snow-Melter at Work

The "worst blizzard since '88" piled New York's streets high with snow and ice, but the mountains couldn't stand long against the withering effect of this vehicle. It is the invention of L. V. Stegens of Canada and is used extensively on the Canadian Pacific railroad. This instrument burns crude oil on the principle of a gas torch, working at a pressure of 60 lb. The 1800-gal. tank burns for 12 hr., causing such terrific heat that the snow disappears almost immediately. This photo was made Feb. 11 on Avenue C, New York

AMAZON PRICES RISE

NEW YORK, Feb. 20—Increases averaging more than 20 per cent on all types of tires are announced by the Amazon Rubber Co. of Akron. The price of tubes remains unchanged.

The increase in the 34 x 4 tires, which follows the general trend of the new Amazon prices, follows:

	1919	1920
Non-skid fabric	$36.50	$46.55
Ribbed fabric	34.65	44.30
Non-skid cord	53.90	69 85
Tubes	5.85	5.85

The new schedule went into effect Feb. 5.

SHOWS BALLSTROM TRUCK

DETROIT, Feb. 19—Although completed too late for the Detroit Auto Show, the new Ballstrom four-wheel truck, made in St. Louis, Mich., is being shown in Detroit this week. The truck is equipped with pneumatic tires and self starter, and has a 144-in. wheel base.

Gasoline Goes Up 16 Cents in England

Latest Increase Causes Bitter Feeling Among Motorists—Demonstrations Planned

LONDON, Feb. 6 (*Special Correspondence*)—Gasoline has gone up 16 cents a gallon (British). The Shell company accounts for the rise on the following basis per gallon as communicated to the press.

	cents
Cost f. o. b. New York	42
Ocean freight	9
Railway freight and distribution	14
Duty	12
Profit	9
	86
5 per cent to distributors	4
	90

Added to this is the tax of 12 cents per gallon, (excepting to truck users and doctors) making the total cost $1.02 cents per gallon. A few years since gasoline of average lighter density than present spirit cost with tax 30 cents a gallon. The reported decision of the Government to abolish the fuel tax in favor of a tax per horse power on cars will not better the situation.

The latest development is a declared day's strike of the taxicab drivers during which no gasoline will be used in the metropolis. There are also signs of a "declaration of war" by consumers against what they believe is an unjustifiable move of the oil interests.

ENGLISHMAN.

Expect Change in Tractor Show Plans

National Exhibit in 1921 to Be Held in Group of Cities, Is Forecast

KANSAS CITY, Feb. 21—"Where do we go from here?" was the question uppermost in the minds of those attending the Fifth Annual National Tractor Show here this week. The question was unanswered at the end of the week and probably will not be answered for some weeks yet. But the firm belief was that those present had attended the last "one big National Tractor Show."

The idea appeared to be that if there is such a thing as a "national" show next year, it will be located in five or more cities, although there is a strong sentiment in favor of a single show at Chicago. It was said that the equipment and parts makers have served notice that they will not exhibit in a number of shows, but only in one show. If several shows were authorized, the parts makers will select a single show and throw their influence to it.

Certain members of the committee were said to favor several shows in which the parts makers would be ignored. If necessary, the parts makers would be barred and only tractors shown. This idea was favored by tractor makers who are well established and who want to show their wares as widely as possible.

The fault with the Kansas City show appeared to be that it was not really a national show except in the representation of exhibitors. This was satisfactory both as to tractors and parts makers. But the dealers present—and they were the objective of the show—represented only a small section of the country. One of the largest firms exhibiting had only 18 dealers present. Most of the firms met only those dealers in the Kansas City territory.

Another objection was that the housing of the show was not adequate and there was not now a suitable site in view for the 1921 exhibit. The Overland Service building was taxed this year and it may not be available again. The Kansas City Tractor Club and the Real Estate Board, however, promised to solve these questions satisfactorily before the final decision is made.

Changes Up to Committees

The decision was vested in the National Demonstration and Show Committee of the National Implement Dealers' Association, which meets in Chicago March 9. The members of the committee are:

Findley P. Mount, Advance-Rumely Co.; I. B. Bartholomew, Avery Tractor Co.; F. J. Gittens, J. I. Case T. M. Co.; Dent Parrett, Parrett Tractor Co.; H. M. Wallace, J. I. Case Plow Works; Harry Bates, Bates Machine & Tractor Co.; H. B. Dineen, Moline Plow Co.; Howard Seely, Oliver Chilled Plow Works; Frank Silloway, Deere & Co.

Another rumor that was current during the latter part of the show was that Guy H. Hall was to be succeeded as manager of the show by A. E. Hildebrand, of the Emerson-Brantingham Co., who has been manager of the national demonstrations. This report was denied by members of the committee. The supposition was that it was involved in the question of location of the future shows.

Aside from the fact that the dealer representation was not all that it should be, the show was voted a success by those interested in the industry. As a local show for consumers, it would have been successful, as a goodly number of farmers were present. During the latter part of the week, there was an active inquiry from this source for threshing machines and plows and much comment was heard on the greatly improved line of implements.

The dealer meetings and other social features of the show were quite successful and were quite representative of the Kansas City district in attendance and spirit, but they were not representative of a larger district.

Britain Hears of Rolls-Vickers' Merger

LONDON, Feb. 6 (*Special Correspondence*) — Notwithstanding the continued currency of rumors in the market regarding a probable fusion between Rolls-Royce and Vickers, Basil Johnson, general manager of Rolls-Royce, states there is no truth in the report. An agreement is expected to be shortly concluded with the Government concerning certain big aero-engine orders, which affect both past and future deliveries, in which presumably the interests of the Rolls company as engine makers, and Vickers, Ltd., as builders of air machines fitted with Rolls-Royce engines, may be regarded as jointly concerned. Possibly the reported fusion has its origin in this fact, and, despite denials, many people believe the report to be well founded.

FILES ANNUAL STATEMENT

DETROIT, Feb. 20—Annual statement of the Edmunds & Jones Corp., lamp manufacturers as of Dec. 31, list total assets of $52,395,080.91. Cash on hand and in banks was $104,893.67; accounts receivable, $475,194.76; inventories, $843,-687.21; plants, less reserves, $900,558.79. Accounts payable were $325,498.11. Reserves for income and war taxes, $154,-234.89. Preferred stock, $890,400. Surplus, representing book valuation of outstanding common stock without par value, $1,016,997.82.

Gross sales for the year were $5,134,-867.77. Gross profit from sales was $591,523.07, and other earnings, $220,-332.02. Net profit for the year was $562,496.92.

WANT EXPORT CAR

NEW YORK, Feb. 20—Charles Meyers & Co., Ltd., mercantile distributers of 327 Broadway, New York, are looking for an assembled car at about the Overland range of price, for distribution in India and Australia.

Railroad Rates to Guarantee Earnings

Pending Enactments Direct I.C.C. to Make 5½ Per Cent Return Possible

WASHINGTON, Feb. 19—The railroad bill providing measures for the return of the railroads to private ownership, has been reported out by the conferees of the House and Senate. It is not certain the bill will pass, as more than two-thirds of the Democrats in the House are opposed to it as well as a large number of Republicans. In view of President Wilson's announced determination of returning the roads to their private owners on March 1, Republican leaders declare it vitally necessary to pass the legislation at the earliest possible moment.

The outstanding feature of the proposed law is the guarantee of a net operating income of 5½ per cent on the property value of the roads. The Interstate Commerce Commission is directed in the bill to establish a level of rates that will yield this return. Provision is made for the creation of a "Railway Board of Appeals" with jurisdiction over all railway wage disputes; for permissive consolidation of the roads into a limited number of systems, and for appropriations necessary to enable the railroads to pass through a period of possible financial difficulties following the relinquishment of Federal control.

Earnings in excess of 6 per cent will be divided equally between carrier's reserve fund and the Federal general railroad contingent fund. The guaranteed return will remain in effect for two years beyond March 1, 1920.

The labor section of the bill creates a tribunal of nine members, three each representing labor, the carriers and the public, to be known as the "Board of Appeals." It will have jurisdiction over disputes between the railroads and their employees. Railway boards of labor adjustment may be established at the option of the carriers and the employees. Decisions of the board must be concurred in by at least five members, one of whom must be from the public group. Each member will receive $10,000 a year.

Forbids Wage Change

The bill provides that wages and salaries, not less than those in effect at the termination of Federal control, must be paid by the carriers until Sept. 1, 1920. The bill gives the commission power to prescribe minimum rail rates and authority to prevent the carriers from engaging in "rate wars," which occurred a number of years ago.

The bill provides that Federal control shall be terminated at 12.01 a. m., March 1, the date fixed by the President, who is given wide power to wind up the affairs of the Railroad Administration. An appropriation of $200,000,000, in addition to unexpended balances in the hands of the Railroad Administration, is made available for this purpose.

Standardized Trend Seen at Boat Show

New Engines Show Concentration by Makers on Certain Designs and Sizes

NEW YORK, Feb. 25—Developments in marine engines for the past two years, as indicated at the fifteenth motor boat show now being staged at Grand Central Palace, show a decided trend by makers toward standardization, both in design and size. In the concentration by manufacturers upon standardized designs, boat builders and owners visualize an era making for greater production and lower prices.

The show in the opinion of managers and exhibitors is by far the most complete and best attended of any of its fourteen predecessors. Departing from the former custom of designating it a motor boat show, with the inference that only the completed product was desirable for exhibition, the show this year carries the additional title of ship and engine exhibit. This has added considerably to the number and variety of the exhibits and drawn an additional class of show visitor.

Motors exhibited, although almost exclusively of pleasure boat design, include a number suitable for use in commercial craft of considerable size, including a number of power-plants designed to operate on heavier and cheaper fuels. Development in this line has been particularly rapid and shows a change, probably due to war experience, which normally would not occur over a two year period, the time elapsing since the last show.

Among the new engines shown were the Mianus, heavy oil burning, in two models, a single cylinder 7½ hp. and a double cylinder 30 hp. Van Blerck showed a new J. V. B., which is to be the only model made by the company. It has four cylinders, 4¾ x 6 in., and is built in two speed ranges—high and medium.

The Kermath Manufacturing Co. exhibited a new Kermath-40, 4½ x 6¼ in., which develops 47 hp. operating a maximum speed. The new Hall-Scott marine engine is shown in three models—the LM-4, 125 hp. four cylinder; LM-6a and LM-6, 200 hp. six cylinder—these engines being furnished for either right or left hand rotation, if desired, for twin installation.

Murray & Tregurtha showed their new model K-6, which follows along the lines which made for the success of the J-6, having four overhead valves per cylinder and quadruple ignition. The bore is 6½ in. and the stroke 7¾ in. Gray had on exhibition the new model V. M., 20 to 25 hp., an overhead-valve four-cycle engine of four cylinders of 3½ x 5 in. Fay & Bowen showed two new engines known as models LN-42, a medium speed, and the TG-45, a four-cylinder, heavily built, slow speed engine.

The New Jersey Motor Sales Co. had three Ford marine engines in its exhibit. This is modeled after the Ford automobile engine, redesigned and rebuilt to create a regular power-plant for any kind of small boat. The Osborne marine engine, built by the Aeromarine Plane & Motor Co., differed from any of the other power-plants shown. The two-cylinder and two one-cylinder engines exhibited have valves of the piston type actuated by connecting rods driven from the camshaft. The peculiarity of this valve action is that at the time of the expansion stroke both the piston and the valve descend, thus rotating the main and valve crankshafts. Advantages claimed are that it contains fewer parts than the usual four-cycle motor and has the simplicity of the two-cycle with the economy of the four.

The Parr-Loichot Engine Corp. had a new C. A. J., built by the Jacobson Engineering Co. It is an overhead-valve type four-cycle engine of 22 hp., 3½ x 5 in. The C. C. Smith Boat & Engine Co. exhibited a hydroplane with an engine built from Liberty motor parts and named the Grant motor. A big engine of the show was the 60 hp., 8½ x 10 in. semi-Diesel, manufactured by the Fairbanks Morse Co. It weighs 8000 lb. and is designed to operate upon kerosene or fuel oil.

Federal Truck Sales Gain $2,000,000 in 1919

DETROIT, Feb. 18—With gross sales amount tot $10,525,265.04, Federal Motor Truck Co. filed its report as of Dec. 31, showing net profits of $1,281,706.86. The gross sales for the year show an increase of approximately $2,000,000 over 1918, and an increase of more than $300,000 in net profits. The balance after deduction for federal taxes in 1918, estimated at $560,000, was equivalent to $3.62 a share on the common stock. Balance this year is equivalent to $8.62 on the 100,000 shares of common stock of $10 par value.

Total assets are $4,452,976.93. Current assets are $3,641,583.07, an increase of approximately $400,000 over 1918. Current liabilities are $1,093,109.95, a decrease of approximately $200,000. Net working capital at the beginning of 1920 was $2,548,673.12, as against $1,889,941.32 January, 1919.

MILHAUPT REORGANIZED

APPLETON, WIS., Feb. 23—The machine shop firm of Conrad Milhaupt & Sons, Appleton, Wis., has been reorganized as a corporation known as the Milhaupt Spring & Automobile Parts Co., with a capital stock of $40,000. A large addition has been erected to the shop, to be used as a factory for making springs and small forgings, and to render general automotive service. The ownership of the business will continue to be vested in Conrad, Edgar A. and Leo P. Milhaupt.

TO MAKE ALCOHOL DEVICES

BALTIMORE, Feb. 20—The Sterno Corp., capitalized at $500,000, ars planning the erection of a large plant in this section for the manufacture of alcohol burning devices for automobile service.

May Stage American Car Show in London

Crowded Conditions at Olympia Expected to Lead to Separate Showing

LONDON, Feb. 6 (*Special correspondence*)—The question of how the next Olympia car show is to be handled is causing considerable controversy here. The demand for space and the number of prospective exhibitors now exceed eht accommodation of the Olympia, which is the only suitable building at present in the metropolis.

One of England's motor experts who is deeply interested in American products has suggested that the American interests join hands and run a show of their own with exhibits of cars, trucks and tractors, farm tractor implements and equipment and tires.

Thus united the exhibit would fill Olympia with little space to spare. He points out that there are about 40 makes of American cars and practically a score of trucks and half that number of farm tractors being handled here, not to mention the scores of American concerns on which a number of importers largely depend.

A suggestion that is meeting with considerable favor in connection with the project of holding one big show is to adopt some of the large buildings at the White City, a summer show resort not far from Olympia. An earlier suggestion was to run shows in rapid succession, with the provision that the exhibitors at the first would automatically be exhibitors at the second the following year. Another suggestion has been to confine the show to motor cars by the exclusion of body works, which hitherto has been a separate section occupying a fourth of the floor space.

An importers' show, conducted independently, has been recommended, and this finds favor among many importers of American cars, as also among some British exhibitors. Just now the official trade views seem divided between a single car show to the exclusion of all else and the possibility of housing a larger show in some war building at Chelsea, which is on the south side of the Thames, and quite as convenient as Olympia.

Some have suggested also that the show period be changed to summer, or, at least to a period when the weather and daylight are more favorable. The question is still an open one, with the indication that one or more of the suggestions will be adopted for the next London motor car show.

RECAPITALIZE NATIONAL

EAST PALESTINE, OHIO, Feb. 20—The National Tire & Rubber Co., at a recent meeting adopted plans for refinancing the concern. Under the new plan the company which is capitalized at $1,000,000 will issue preferred stock to the amount of $1,000,000 in addition to the $150,000 common stock.

S.A.E. Hears Plea for Tractor Service

Need for Instruction in Use and Repair Urged at Kansas City

KANSAS CITY, Feb. 21—The Tractor Dinner of the Society of Automotive Engineers, held here Thursday night, might well be called a "service" dinner, as that was the topic. Three of the four speakers talked mostly on service and the toastmaster constantly referred to that feature of the business. Perhaps the combination of a banker, dealer and engineer all talking service may sound a bit unusual, but that was the case.

H. C. Buffington, vice-president of the S. A. E., presided and introduced E. E. Peake, a real estate dealer, who is identified with the National Automobile Dealers Association and other automobile interests. Peake let it be known that his interests were mostly in Kansas City and through that city linked with tractors, but he did this nicely and was well placed as a toastmaster.

J. W. Perry, a banker, was the first speaker. He approached the subject of the dinner as a tractor owner and he told plainly what he thought of the faults of an industry that, when it sold him a machine to use on his farm, did not give him adequate facts by which he could be guided in its use. Perry's objections to the tractor service extended to him were:

> A lack of sufficient instructions to himself and his help in the use of the machine.
>
> A lack of data as to the life and capabilities of the machine to enable him to estimate the life and usefulness of his tractor and its cost of operation.

As a banker and a farmer, his advice to those present was:

Prices Must Come Down

> All must realize that not for long will they be selling tractors on $2.50 wheat and like values of other products, but that these commodities must be reduced in price and the cost of tractors must come down with them. He expressed the hope that the present cost of tractors was abnormal and that the engineers and production men would find means to reduce them. He asked for an extended course in educating the public in the tractor idea and a definite plan for education of the user. He said that the machines should be built as near foolproof as possible and for economy of use. Dealers must be educated in the necessity of not overselling their machines and they must preach the doctrine of care. He held up as an example of efficient merchandising the numerous Ford service stations and insisted that wherever tractors are sold there must be proper precautions taken to keep them running.

When these conditions are met, Perry assured his hearers, there would be plenty of money in the banks for the industry, just as there is now plenty of money waiting for the automobile dealers. But frankly, he said, bankers were waiting for the men behind the tractor to prove the efficiency of their product.

R. F. Crawford, president of the Kansas City Tractor Club and a dealer, asked the engineers to get in touch with their sales departments so that their machines might be designed for selling and service and, consequently, for the greatest and best use of the public. He referred humorously to the number of designs of tractors as represented by the number and positions of the wheels, and he said for the good of the trade that engineers, if possible, should work to a design that would always look like "a tractor," so that people would know that a tractor was a tractor and not wonder what sort of a machine it was when it moved across a field.

He also appealed to all concerned in the tractor trade to quit referring to another's product as "junk," but to adopt the idea so prominent a feature of the motor car trade of admitting the good qualities of the other man's product and selling their own on betterments. He said that the consumer often was disgusted because, as he passed from one machine to the other, he heard all of the others condemned. But above all, Crawford wanted a machine on which service could be given.

O. B. Zimmerman, an engineer, presented as lantern slides a number of curves that had been prepared on data regarding plowing speeds supplied by Professor Davidson and the Kansas Agricultural College. Cost of operation through the use of power was the basis of the tests. The conclusion was that the most economical plowing speed was 2 m.p.h.

M. B. Morgan, recently in the Ordnance Department of the army, showed some moving pictures of the use of crawler tractors by that department. His talk was marred by inefficient handling of the films and by breakage.

OVERLAND STRIKE ENDS

TOLEOD, OHIO, Feb. 20—Leaders ofa strike at the Overland plant, which involved 6000 workmen, this week formally called off the strike. Union leaders said the end was brought about by the action of Federal Judge Killits, in ordering picketing discontinued. Judge Killits held the controversy was at an end, and there was no reason for maintenance of the picket lines. Labor leaders protested, but realizing the delay incident to the adjudication would require months, decided to call off the strike. They said conditions at the plant now are satisfactory. Company officials said to-day 14,000 men are at work at the plant.

JOHNSON TRIPLES CAPITAL

PHILADELPHIA, Feb. 20—Johnson Motor Wheel Co. has tripled its capital to $1,500,000 and is enlarging its plant.

Paris Exhibition for 1920 Abandoned

Majority of French Car Makers Vote to Lay Show Over to 1921

PARIS, Feb. 13 (*Special Correspondence*)—There will be no automobile show in Paris in 1920, the next exhibition in the Grand Palais having been fixed for the fall of 1921. This is the official decision of the majority of the French automobile manufacturers. At the present time the French industry is of the opinion that a show every two years is quite sufficient.

They also claim that having made a great effort to get out new models for the 1919 show, and not yet being fully in production on these models, an exhibition coming in the fall of 1920 would only disturb the industry and hold back production. This action has been taken in the hope that England, Belgium and Italy will follow suit, thus abolishing all European automobile shows for the present year.

It is very doubtful if the French makers can induce other continental countries to follow their example. England is already committed to a show in the fall of 1920, and Belgian makers, who were unable to stage a show last year, are decided to hold one next winter. The same applies to the Italian industry, which has not yet had a post-war automobile show.

Under these circumstances there is a great possibility that the French manufacturers will be obliged to alter their plans, and stage a show after all. Although a majority has just voted against an automobile exhibition, there is a strong minority which protests against this action. This minority points out that French makers will lose prestige if all other European countries hold a show and Paris is showless.

French makers too are out for export business and would be obliged to take part in any exhibition held in London and Brussels or Turin. Having to prepare models for these shows, they might as well prepare them for their own exhibition in the Grand Palais.

Call Show Policy "Foolish"

"Because we are full up with orders for two years ahead, we have no intention of abolishing our sales department," states one leading French manufacturer, "and it would be just as foolish for us to abolish our annual show because at the the present time we are unable to meet demands." This maker claims that the anti-show campaign has been got up by the big manufacturers who have secured central show rooms in the Champs Elysées, and who are anxious to keep out the smaller and less fortunate firms.

It would not be wise to accept this decision of the French manufacturers as final. Undoubtedly there will be a stiff fight on that show question and there is yet time for those in favor of the exhibition to win the day.

Automotive Exports for November

COUNTRIES	TRUCKS		CARS		PARTS	TIRES	GAS ENGINES	
	Number	Dollars	Number	Dollars	Dollars	Dollars	Number	Dollars
Austria-Hungary	.....	.....	.....	.....	$35	$3,392	.....	.....
Azores and Madeira Islands	2	$1,816	25	$12,078	183	.....	.....	.....
Belgium	5	14,000	112	210,494	19,228	122,493	11	$5,524
Denmark	78	235,406	127	213,466	42,766	137,010	31	14,590
Finland	3	5,935	32	48,467	3,925	23,367	.....	.....
France	261	893,819	176	178,610	15,478	250,491	88	95,550
Gibraltar	.....	.....	18	7,900	45	.....	.....	.....
Greece	6	9,077	26	40,186	4,105	2,670	.....	.....
Italy	3	14,379	.....	.....	10,255	19,828	.....	.....
Netherlands	15	36,925	209	263,999	15,752	305,605	23	33,089
Norway	61	129,292	253	337,748	50,109	44,871	.....	.....
Portugal	7	20,800	89	120,445	11,879	69,228	3	8,621
Roumania	.....	.....	101	54,313	5,891	27,196	17	44,536
Spain	10	9,437	69	104,094	12,109	21,948	37	30,794
Sweden	35	69,387	147	232,088	9,673	115,175	35	29,892
Switzerland	23	27,437	36	36,992	684	41,880	.....	.....
Turkey in Europe	20	8,800	26	16,176	4,750	19,883	.....	.....
England	316	481,679	1,040	1,128,811	588,195	119,081	33	17,982
Scotland	2	1,779	10	10,292	9,853	48	.....	.....
Ireland	.....	.....	171	170,573	632	.....	.....	.....
Bermuda	.....	.....	.....	.....	5	.....	.....	.....
British Honduras	.....	.....	2	1,788	932	669	.....	.....
Canada	133	219,278	774	922,139	1,735,243	33,789	239	156,203
Costa Rica	.....	.....	.....	.....	601	962	1	1,654
Guatemala	3	3,086	20	23,069	4,121	3,387	.....	.....
Honduras	.....	.....	2	1,741	2,588	2,064	.....	.....
Nicaragua	.....	.....	5	3,807	3,298	4,626	.....	.....
Panama	2	1,007	22	27,551	3,051	11,676	.....	.....
Salvador	.....	.....	9	10,754	12,830	1,184	1	2,525
Mexico	99	163,864	322	287,047	83,553	78,365	19	19,748
Newfoundland and Labrador	1	1,926	13	17,354	854	1,309	4	15,996
Barbados	1	3,500	10	7,421	3,083	1,281	.....	.....
Jamaica	14	18,110	28	21,252	5,499	9,042	3	4,365
Trinidad and Tobago	10	14,611	11	14,510	9,637	8,245	2	3,131
Other British West Indies	6	3,580	11	8,764	1,726	4,059	.....	.....
Cuba	95	148,131	372	373,955	97,605	122,346	20	34,148
Danish West Indies	.....	.....	.....	.....	1,512	173	.....	.....
Dutch West Indies	.....	.....	1	483	213	1,659	.....	.....
French West Indies	1	3,000	22	17,992	9,577	6,223	.....	.....
Haiti	2	2,500	11	8,493	3,860	6,134	.....	.....
Dominican Republic	4	2,511	24	25,561	13,763	12,899	.....	.....
Argentina	4	21,066	298	309,851	426,654	132,114	78	65,906
Bolivia	.....	.....	4	5,000	1,345	1,916	.....	.....
Brazil	36	42,819	597	387,308	32,023	60,575	1	1,500
Chile	.....	.....	1	2,500	10,471	14,221	8	8,381
Colombia	22	15,185	24	29,873	8,849	3,338	.....	.....
Ecuador	.....	.....	10	14,516	614	3,480	.....	.....
British Guiana	5	2,519	6	5,991	3,031	4,647	2	6,951
Dutch Guiana	.....	.....	2	1,160	1,209	332	2	2,536
French Guiana	1	504	.....	.....	154	70	.....	.....
Peru	10	12,938	29	43,298	9,807	19,075	32	30,037
Uruguay	2	5,540	350	242,460	26,003	51,464	.....	.....
Venezuela	5	2,519	8	9,635	7,422	16,714	9	14,259
Aden	.....	.....	4	3,330	.....	.....	.....	.....
China	4	8,785	30	52,241	7,771	11,776	.....	.....
Japanese China	.....	.....	1	3,500	.....	.....	1	2,670
Chosen	.....	.....	4	3,200	5,873	3,049	14	22,271
British India	13	27,866	228	268,436	12,992	52,280	2	1,940
Straits Settlements	4	12,336	66	76,929	12,364	92,440	7	5,809
Dutch East Indies	22	52,148	74	90,407	27,649	43,495	4	6,435
French East Indies	10	8,126	.....	.....	149	.....	.....	.....
Hongkong	.....	.....	3	5,149	383	599	.....	.....
Japan	49	32,557	84	57,851	22,636	15,547	15	57,993
Persia	.....	.....	1	550	110	400	.....	.....
Russia in Asia	5	5,077	.....	.....	25,513	1,551	.....	.....
Siam	.....	.....	4	5,000	52	.....	.....	.....
Turkey in Asia	3	12,615	39	40,536	110	2,826	.....	.....
Australia	7	7,066	393	379,388	48,879	98,904	.....	.....
New Zealand	2	2,802	226	275,363	29,591	62,134	8	10,763
Other British Oceania	1	1,751	5	2,929	363	1,402	.....	.....
French Oceania	.....	.....	.....	.....	2,682	.....	.....	.....
German Oceania	5	5,135	3	3,320	657	412	1	614
Philippine Islands	156	174,647	250	251,407	49,061	57,832	153	158,014
British West Africa	94	102,684	61	59,513	27,760	27,461	.....	.....
British South Africa	10	16,680	449	512,674	28,326	18,220	22	14,900
British East Africa	.....	.....	12	14,033	1,587	247	.....	.....
Canary Islands	.....	.....	1	1,065	.....	176	.....	.....
French Africa	15	15,147	23	15,780	4,134	4,380	17	19,224
Portuguese Africa	.....	.....	6	3,440	106	.....	.....	.....
Egypt	9	9,767	61	38,682	9,032	634	16	11,525
Total	1712	$3,143,351	7693	$3,177,728	$2,644,460	$2,438,058	994	$392,901
SHIPMENTS TO NON-CONTIGUOUS TERRITORY								
Alaska	1	$350	3	$3,068	$2,052	.....	.....	.....
Hawaii	33	65,089	140	138,890	34,592	$138,314	.....	.....
Porto Rico	19	52,991	47	86,720	25,759	47,752	.....	.....

FILIPINOS STUDY TRACTOR

WASHINGTON, Feb. 14—A tractor school was established in the Philippine Islands last November, according to a report received by the Bureau of Foreign and Domestic Commerce. Thirty natives, many of whom are graduates of the Central Luzon Agricultural College, are learning the details of tractor operation. The course of instruction lasts one month, during which time the students are given free board, tobacco and pocket money. On graduating they are pledged to work for three months at a salary of 30 pesos and board, for any hacienda owner who buys a tractor. This will enable the dealers to assure a purchaser a skilled operator.

TO MOVE EXPORT OFFICES

NEW YORK, Feb. 25—Export offices of the Garford Motor Truck Co., will be moved from Lima, Ohio, April 1, to New York, where offices have been obtained at 41 Park Row. The change is made to facilitate the transaction of Garford foreign business. Earl F. Sayers will continue as director of exports.

Trailer Association Completes Road Act

Will Propose Its Adoption in All States as Standard Regulation

NEW YORK, Feb. 21—Recommendations for trailer legislation prepared by the Trailer Manufacturers Association, with headquarters here, have been incorporated in a uniform vehicle bill. This has been drawn up by a special committee in Washington representing the National Association of State Highway Officials, the Highway Industry Association, the National Automobile Chamber of Commerce, and the American Automobile Association.

The provisions of this bill were approved recently by national associations representing the automobile, motor truck and trailer manufacturers, dealers and users.

Trailer manufacturers hope by furnishing information as to type, sizes and construction of trailers and the way in which they are used, it will be possible to aid legislatures in framing laws that will protect the highways and insure safety for all without placing unnecessary obstacles in the way of the development of this means of highway transportation.

The use of trailers is new and limited in most states as compared with motor vehicles, and to avoid repeating the experience with motor vehicle legislation which has resulted in 48 varieties of laws governing the operation of vehicles, the trailer manufacturers are calling attention of legislatures and highway authorities to provisions of a proposed uniform vehicle act and asking that bills now pending and certain provisions of existing laws be amended to conform with the provisions of the uniform bill.

Next year, when practically all states will hold regular sessions of the legislatures, concerted effort will be made to have the uniform bill introduced and passed. Steps have been taken by the trailer association to have amendments introduced in the New York Legislature and in the legislatures of New Jersey and Massachusetts by which they hope to secure more favorable laws.

Three Frontenacs to Race at Indianapolis

INDIANAPOLIS, Feb. 20—Louis Chevrolet, designer of racing cars, has entered three Frontenac fliers for the eighth annual international 500-mile sweepstakes on the Indianapolis Motor Speedway, May 31, raising the number of cars nominated for the event to seven. With his three Frontenacs Chevrolet will in reality have a representation of six cars in the Indianapolis race, being the designer also of the three Monroe cars previously nominated for the event by William L. Small.

In the trio of Frontenacs that he campaigned during the last several seasons Chevrolet surprised the racing world with their lightness, secured through the use of aluminum on a scale that had been regarded as impossible.

TIRE PEAK, 80,000,000

AKRON, OHIO, Feb. 20—Statistics compiled by the Chamber of Commerce show the peak demand for tires in the United States will be 80,000,000 a year for passenger cars and motor trucks. The present tire output of the country approximately is 45,600,000. It is estimated at the end of the present year the annual requirements will be 57,000,000 tires. This estimate is based on figures of automobile manufacturers, indicating an output this year of approximately 1,600,000 cars and 400 000 trucks.

Hairpin Turns Test Drivers on Florence Course

A fine view of the hairpin turns on the Consuma Hill, near Florence. In this climb the amateur driver Ascari was first in a Grand Prix Fiat

Car Advertisements Crowd Show Edition

St. Louis Post-Dispatch Obliged to Set Limit on Copy Space

ST. LOUIS, Feb. 20—An interesting advertising condition was reflected here to-day that will probably be of interest to automotive manufacturers. Local advertising and newspaper men say that the condition here is likely to become general. The situation was this:

The *Post-Dispatch*, the chief advertising medium of the newspapers here, had copy in for 320 columns of advertising on this Sunday, just previous to the opening of the show. Because of a lack of white paper, each advertisement calling for more space than 1½ columns was reduced to this space and an automobile section of half the size of regular newspaper page of 12 pages was printed. A few of the reduced ads were printed in regular news pages. If the supply of white paper had been ample, this paper would have printed 40 regular sized pages of advertising alone, with text matter extra.

The one thing that the paper was proud of was that every advertiser represented in the contracts was given some space, but the fifteen who had arranged for full-pages got only the 1½ column space each. None of the publicity sent to the paper by the companies was used. This was a waste of white paper that might have relieved the print paper situation.

But the big question remains: Is the white paper situation becoming such that the automotive advertisers and others using newspaper space freely will have to reorganize their plans entirely to meet a new condition? Certainly it looks bad for the publicity department that sends out long stories. Continued shortage must inevitably lead to a survival of only the news "most fit to print."

Space Demand Large at Electrical Show

NEW YORK, Feb. 20—Demand for space at the New York Electrical Show, to be held in Grand Central Palace, Oct. 6 to 16, has been large. A feature of the show to which particular attention is being given this year is the high speed production machinery to be shown in the industrial display occupying the greater part of the second and third floors.

Electric lathes and drills will be arranged to show the advantages of the motor-driven factory over the shop that is incumbered with belts and shaftings. Electric industrial trucks, such as are used in factories and in practically all important freight stations, will be shown in operation.

A demonstration space has been set aside for the trucks. The show will be under the general management of George F. Parker.

Congress Gets Hull Aeronautics Bill

Would Create Department for Aircraft Development in All Branches of Service

WASHINGTON, Feb. 20—The reintroduction of the Hull bill for the creation of a Department of Aeronautics, in Congress last week, was the first step by the House Military Affairs Committee toward the establishment of a department on what is confidently expected to be sane lines.

The New bill, which was before the Senate recently, subjected to considerable amendment and returned to the Senate Military Affairs Committee at the request of Senator New, is now regarded as dead, and it is not expected that this bill will meet with any further consideration. The New bill, as has been pointed out, provided for a separate military air force and was primarily a military aviation bill, giving second consideration to commercial aeronautics.

The Hull bill, which was introduced in Congress in November, 1919, and reintroduced last week by Congressman Hull, is primarily a bill for the production, development, design and maintenance of aircraft and for the regulation of aviation in the United States. It would create a Department of Aeronautics with a director and three assistant directors. One assistant director would be in charge of production and design for army aviation, one for naval aviation and a third for the post office and other departments of the Government.

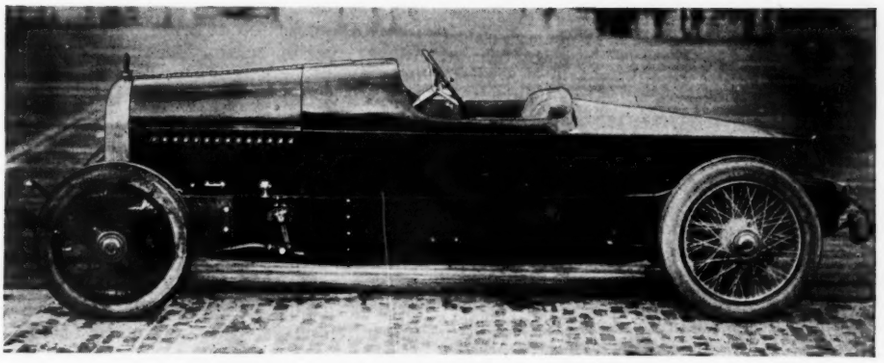
The director would have complete control over production, procurement, purchase, manufacture, design and development of aircraft, aircraft engines and parts. One provision of the bill which is likely to meet with considerable opposition and antagonism would authorize the director to construct factories for the manufacture and production of aircraft.

Control Under One Head

The bill further provides for the transfer of all personnel and appropriations necessary for the operation of the Department of Aeronautics in its rôle as buyer and production manager for Government aircraft from the other departments. It further provides that upon the request of the Secretary of War, Secretary of the Navy or Postmaster General, the Director of Aeronautics would be empowered to transfer aircraft, landing fields, etc., to the various departments as they may require.

It is quite likely that the provisions in the bill authorizing a $12,000 salary for the Director of Aeronautics will meet with opposition. The new bill carried a similar provision and was obliged to take an amendment setting the salary at $8000.

It is also anticipated that the bill introduced by Congressman Morin and which, as has been previously stated, is the most likely one to win the approval of all parties concerned, will also be given careful consideration. This bill is primarily a commercial aviation bill. It would leave operation of airplanes with the various Government departments, but would control aerial traffic and navigation, promulgating the necessary rules and establishing a Board of Control under the Director of Aeronautics, consisting of members representing Government Departments, so that all aeronautical needs could be co-ordinated.



Cunningham Which Made Fast Speed Marks

This Cunningham 8-cylinder stock car was driven 10 miles at Sheepshead Bay by Ralph De Palma in 6 min. 35.4 sec. The trials were held under A. A. A observation

Zenith Tire Absorbs Midcontinent Company

CLEVELAND, Feb. 20 — The Zenith Tire & Rubber Co., in order to take care of a great volume of business, has purchased the Midcontinent Tire Mfg. Co. of Wichita, Kan. Announcement of the deal was made at a meeting of stockholders in the Hotel Winton last week, and the action was approved.

Plans also have been made by the company for the development of the 236-acre tract of land running from Euclid Avenue to the Nickle Plate and Lake Shore tracks on the property known as the Telling-Belle-Vernon farm. The entire property lying between the Nickle Plate tracks and Euclid Avenue is platted to provide homes for workers in the Zenith plant and also for employees of other manufacturing plants near by.

A convention of district managers and the sales force was held with an attendance of 150 men.

President F. W. Metzger, General Manager B. C. Swinehart, Consulting Engineer J. A. Swinehart and other officers outlined accomplishments to stockholders and laid before them developments which are under way for early action.

TAKES DUTY OFF SAMPLES

WASHINGTON, Feb. 20 — Samples for the Bordeaux Fair will be admitted by the French customs authorities under bond, free of duty, or upon payment of the duty, which will be refunded upon re-exportation of the samples, according to a cable received on Feb. 11, by the Bureau of Foreign and Domestic Commerce from Consul Jaeckel. The Compagnie General Transatlantic will return the samples to the United States without charge.

Would Abolish Mark on Automobile Cars

Iowa Motor Trades Bureau Believes Unmarked Cars Would Stop Vandalism

DES MOINES, Feb. 20—At a recent meeting of the directors of the Iowa Motor Trades Bureau action was started which it is thought may help solve the question of damage to motor cars in transit. For a long time Iowa dealers have been having a great deal of trouble in receiving their cars intact. Hoboes and vandals have sought the soft cushion of the cars in transit as a comfortable place to locate while beating a ride.

In some cases the damage has been slight but there have been frequent cases where different parts were stolen, and occasionally even tires and rims. As one means of fighting this evil directors of the trade suggest that cars be not shipped in freight cars marked with the word "automobile." They have made this suggestion to the U. S. Railroad Administration, the traffic managers of a number of Middle West railroads, and also to the National Automobile Chamber of Commerce.

San Francisco to Have Aircraft Show

NEW YORK, Feb. 20—The first national aeronautic exposition to be held on the Pacific Coast will be at the Exposition Auditorium, San Francisco, April 21 to 28, inclusive. It is one of three national expositions of commercial aircraft to be held in the United States. The aircraft and equipment shown in Chicago in January, and in New York in March will be supplemented by other craft which could not be assembled in time for these shows. Exhibits at the New York show will be shipped to San Francisco. The San Francisco show has the sanction, approval and patronage of the Manufacturers Aircraft Association. Show headquarters until March 20 will be at suite 1905, 501 Fifth Avenue, New York. After that date they will be at the Hotel St. Francis, San Francisco.

American Tractors Wanted in Sweden

Shortage of Labor and Horses Causes Demand for Power Equipment

WASHINGTON, Feb. 20—A large demand for American tractors is reported from Sweden by Consul W. H. Sholes to the Bureau of Foreign and Domestic Commerce. Sweden's four factories, with an estimated annual output of 400, are entirely unable to meet the situation.

Owing to the absence of horses and the labor shortage, the employment of modern agricultural machinery is making considerable headway in the country, and the Swedish farmer, having accumulated much money during the war, has suddenly become a great purchasing power in the markets of the world.

The national wealth of Sweden in 1908 was $4,080,000,000, of which 25.8 per cent was in landed property, including live stock and equipment. To-day it probably is over $6,000,000,000.

The farms of Sweden consist mostly of small holdings. In 1910 about 48.23 per cent of the country was devoted to farming, as compared with 60.92 per cent in 1890. The loss was largely due to the emigration to the United States. Only 10 per cent of the farms are above 100 acres. Of these about 45 per cent are owned and about 55 per cent are rented. There are about 8000 to 10,000 farms in the Goteborg consular district.

Plowing is done during the autumn and the tractor is coming into considerable use for this purpose. The high price of horses (approximately $804 per head) and of manual labor ($2.15 per day) will doubtless force the conservative Swedish farmer to adopt labor-saving machinery throughout.

The size of tractor becoming most popular is the 20 hp. type combined with a plow with two or three shares of the round-wheel type. The caterpillar type does not meet with favor in Sweden.

The farmers of Sweden have lately formed co-operative societies. These societies are buying machinery and other things for their constituent members. They usually ask for a credit of four to six months. Swedish dealers usually prefer to buy tractors from the United States c.i.f. Goteborg or f.o.b. New York, and also desire credit from two to six months. The present ocean freight rate (Dec. 30, 1919) is between $1.75 and $2.00 per cubic foot.

Burn Alcohol and Kerosene

Due to the lack of gasoline in Sweden, the Swedish farmer is using sulphite alcohol (pulp alcohol) with some success. Now, however, kerosene, which is preferred, is becoming cheaper and is coming into use again. Crude oil, on the other hand, is extensively used for larger engines.

The principal agricultural sections of this consular district are the plains of Vastergotland and Halland, and the chief agricultural center is Goteborg. Planting is done in the latter part of April or the first part of May, depending on the arrival of spring and the harvesting is usually done in October. The nature of soil varies greatly. On the whole it may be considered as rolling, although stony and mountainous ground is common. There are numerous river basins, but these have not been cultivated to any great extent.

Modern agricultural machinery has only in recent years come into use in Sweden. There is little or no demand for thrashing machinery, the Swedish thrashing machine being considered here as the equal of the American product.

The best distributing center is undoubtedly Goteborg, which has the most excellent lines of communication with the surrounding district. The business of the district could very well be handled by one firm and its travelers.

Rules Government Must Pay Motor Vehicle Tax

ATLANTA, GA., Feb. 20—Motor vehicles operated in Georgia by the United States Government will hereafter be required to pay the regular motor vehicle license tax. This is a decision handed down by Attorney General Clifford Walker at the request of Secretary of State S. G. McLendon. The latter asked for a legal opinion in view of the fact that the Government is not required to pay a tax on properties it owns in the state. An effort will be made to collect tax on all motor vehicles operated by the post-offices of the state, the army or navy, or any other motor vehicles owned and operated in Georgia by the Federal Government.

Mississippi Defeats $25,000,000 Road Bill

JACKSON, MISS., Feb. 20 — The Pate bill, appropriating $25,000,000 for the construction and maintenance of good roads in Mississippi and providing for a general election on a bond issue for this amount, was defeated in the lower house of the State Legislature recently. The vote against the bill was 64 to 52, and it came after several hours of heated discussion of the measure. Defeat of the bill is believed to have been due to the project, now before Congress, to federalize the highway systems of the United States. The Mississippi lawmakers appeared unable to realize that their state would be just that much further advanced in the matter of highways, even were the federalization plan put through. It is believed that the popular vote of Mississippi would have favored the bond issue, and it probably will come before the next session of the Legislature, possibly in a slightly different form from the Pate bill.

ARMY TO REPAIR TRACTORS

WASHINGTON, Feb. 20 — The War Department has asked Congress for $124,500 for the construction of a tractor repair shop at Fort Sill, Okla.

Report Progress on British Oil Wells

Hardstoft Well Yields 1900 Barrels — Other Drillings Show Signs of Success

LONDON, Jan. 30 (*Special correspondence*)—The official report of the progress made during the past year with the oil drilling operations which have been carried on by S. Pearson & Son, Ltd., on behalf of the British Government in Derbyshire, North Staffordshire and Scotland, is considered satisfactory. The position at the end of 1918 was that 11 drilling sites had been selected, seven in Derbyshire, two in North Staffordshire and two in the Midlothian district of Scotland.

To make a thorough test of the Derbyshire district, a chain of seven wells was planned, covering a distance of approximately 20 miles. The results here have been satisfactory. Oil was struck in the Hardstoft well at a depth of 3077 ft., and has continued to flow steadily. Up to the present time 1900 bbl. of crude oil have been obtained from the well and put into storage.

Since oil was first struck on May 27, 1919, indications of oil have also been met with in several of the other wells. Considerable quantities of natural gas have been encountered, a gas horizon occurring near the junction of the coal measures and the millstone grits, and at Heath a flow of gas amounting to 400,000 cu. ft. per day was met with. The position of Ridgeway, in the extreme north, is that this well has reached the limestone without having so far encountered any signs of oil.

The two wells in the North Staffordshire district are about eight and a half miles apart in the neighborhood of Stoke-on-Trent. Oil deposits have been known to occur in the coal mines in this district, although so far none has been met with in the borings.

Two sites have been chosen in the Midlothian district of Scotland—one at West Calder, about 20 miles southwest of Edinburgh, and the other at d'Arcy, eight miles southeast of Edinburgh. Encouraging results have been obtained at West Calder.

At the present time work is in progress at all these sites, and most of the wells have been carried to considerable depth, the deepest being Renishaw (Derbyshire), which has now reached a depth of 3645 ft. During the last six months the work has been delayed by difficulties in obtaining casing and other material and delays in railway transport.

ENGLISHMAN.

NEW LABORATORY READY

CHARLOTTE, N. C., Feb. 20 — McClaren Rubber Co., Charlotte, N. C., has just completed a large chemical testing laboratory, which for modern equipment is one of the finest of its kind in the industry. H. L. McClaren, president of the company, reports that McClaren production is rapidly increasing.

Would Enlarge Aid For Western Roads

Secretary of Agriculture Says Government Owned Land Makes This Necessary

WASHINGTON, Feb. 20 — Speaking recently before highway representatives from western states, Edwin T. Meredith, secretary of agriculture, stated his belief that in the western states, where large areas of Government lands are located, the Federal Government should adopt a system of financial co-operation more liberal to the states than is the case in the rest of the country.

"I think we must recognize the fact that the existence of these large areas of Government lands places these states in a somewhat different situation from the remainder of the country," said Meredith, "and that it would be only equitable for the Federal Government to increase its percentage of co-operation over the present basis. I am also heartily in favor of continuing the appropriations for the building of national forest roads. These forests constitute a great natural resource and their preservation and development is a national responsibility which ought to be met in full measure."

Meredith advocated active continuation of present federal and state co-operation in connecting state road systems with the systems of adjoining states in order that the working out of an adequate highway program for the whole United States may proceed in an orderly manner. He also advocated the continuance of work now going forward under the Federal Aid Road Act.

"As 1921 is the last year covered by the act," he said, "it would be highly desirable, in my opinion, for Congress to make provision as promptly as possible for the continuation of the work under the present system by an appropriation of at least $100,000,000 for each of the four fiscal years beginning with 1922."

Turn Over 24,000 Army Trucks for Road Work

WASHINGTON, Feb. 20—The date the War Department has turned over to the United States Department of Agriculture approximately 24,000 motor vehicles, as provided in Congressional legislation empowering the latter department to distribute this war material among the State highway commissioners for use in road building, allotments of the vehicles to be based on the amount of Federal aid for roads which the States receive.

This is practically all the vehicles which the War Department has to release. Of this total 12,000 have been delivered to the States. The remainder will be distributed as fast as railway cars can be secured for their transportation. Representatives of the Bureau of Public Roads, in charge of the matter, believe that within two or three months all of the vehicles will have been delivered to the States. This equipment promises to be a great aid in carrying out the large road building program for 1920.

The State highway commissioners are also interested in securing allotments of tractors, steam shovels, locomotive cranes, automotive cranes, industrial railway track, dump cars and industrial locomotives which remain to be disposed of by the War Department. A measure known as the Kahn bill, directing the Secretary of War to release this material for the State highway commissioners, has passed the Senate and has been reported out of committee in the House. Until the Secretary of War has been directed by Congress to turn over this equipment it is not likely that it will be available for State distribution.

Financial News

Nash Motors Co. reports net income after taxes of $5,089,036 for the year ending Nov. 30, 1919. The balance available for the common stock after deducting preferred dividends amounts to $4,753,036, equivalent to $95.06 per share, on the outstanding 50,000 shares, as compared with $24.47 last year.

Gray & Davis, Inc., Cambridge, Mass., has declared a dividend of 50 cents a share on the common stock, the first to be paid on the present issue. The dividend is payable on March 1 to stock of record Feb. 24.

Columbia Tire & Rubber Co. has increased its capital stock to $2,000,000 to provide for contemplated extensions.

Emerson Brantingham Co., for the year ended Oct. 31, 1919, shows net profits of $1,323,419 after federal taxes and depreciation. The surplus after preferred dividends was $450,484. The balance sheet as of Oct. 31 shows cash amounting to $617,741; total current assets of $17,265,925, and current liabilities, $3,986,811.

NATIONAL BODY EXPANDS

ATLANTA, Feb. 20—The National Body Manufacturing Co. of Nashville, Tenn., has increased its capital stock from $50,000 to $150,000, to expand the business and increase the capacity of its plant. The company makes a special body for the Ford chassis.

SPECIALTY COMPANY GROWS

EAU CLAIRE, WIS., Feb. 20 — The Auto Specialty Mfg. Co., Eau Claire, Wis., is preparing to build a new three-story factory building, which will be ready to begin production about May 15. The company recently increased its capital stock to $100,000.

STEWART PROFITS SHOWN

NEW YORK, Feb. 20 — Net profits after expenses, depreciation and federal taxes of $1,963,574, equivalent to $4.90 a share, is shown in the Stewart-Warner Speedometer Corp. annual statement just issued.

Propose Federal Registry of Cars

Congress Gets Bill Providing Fee for Government Licenses— Makers Exempted

WASHINGTON, Feb. 20—The establishment of a Federal Motor Registration Bureau in the Department of Justice, with registrars in each State to certify transfers of passenger cars, trucks, airplanes and motorcycles and prevent the theft of motor vehicles, would be provided by a bill introduced by Congressman Harreld this week in the House of Representatives.

The bill would establish a bureau with a sum of $50,000 and would give it authority over automobiles, automobile trucks, automobile wagons, motorcycles, motor boats, airplanes or any self-propelled vehicles not designed for running on rails. The registrars to each State would be appointed by the Attorney General, and would receive applications for and issue certificates of ownership describing the motor vehicles as sold within each State.

They would issue new certificates of ownership when the vehicles would be resold. The owner of the vehicle, transferring it by sale or otherwise, would be obliged to use a duplicate bill of sale, describing the vehicles sold, giving the engine number, the car number and other distinguishing marks, the duplicate being mailed promptly to the Federal Motor Registrar in the State. Upon receiving copy of the bill of sale, the registrar would issue a certificate of ownership to the bureau.

This bill would not apply to sales made by manufacturers of motor vehicles to dealers when they are purchased for the purpose of resale to the consumer. The registrar would collect $2 from the person selling the car or from the person buying it as compensation for the issuance of certificate of ownership. The $2 fee would be the pay the registrar would receive for his services.

A clause provides that if the fees are more than $3,000 for the calendar year, the surplus would be paid into the Treasury of the United States. In such event, States such as New York would be paying into the Treasury of the United States the sum of $190,000, if the sales continue in proportion to those of 1919.

Would Record Transfers

The Federal Motor Registrar would keep a complete record of all transfers and would not issue a second certificate of ownership on the same vehicle until the first certificate has been surrendered and cancelled. It would be unlawful, if this act were passed, for any person to buy a motor vehicle from another person if the second party would be unable to produce a certificate of ownership signed by the Federal Motor Registrar. Both the seller and the buyer would be deemed guilty, the one of theft and the other of receiving stolen property, and would be subject to penalties.

Brown Body Company Plans $350,000 Plant

CLEVELAND, Feb. 20 — One of the important developments in automobile circles in the last week was the announcement that the Brown Body Corp. will immediately construct a $350,000 plant at West Ninetieth Street and Maywood Avenue. In it bodies for automobiles, trucks, fire apparatus and general commercial vehicles will be made. The structures, two in number, are to be built on a six-acre tract that has frontage on the Big Four and Wheeling & Lake Erie railroads.

The first unit will comprise a three-story building, 260 x 60 ft. The second building will be of saw tooth type, 110 x 170 ft., and will be between the main building and an "L" to the main building, which will be three stories and 170 x 60 ft.

The Brown Body Corp. is a $1,000,000 concern and is a reorganization of the Brown Carriage Co., 3147 Superior Avenue. Officers are: Paul J. Brown, president; Walter G. Schmunk, vice-president; Carl Halle, treasurer, and John H. Price, secretary.

The production end of the new plant will turn out automobile bodies in lots of 100 to 1000. The Superior Avenue plant will house the main offices.

PATENT TRUCK BODY

ATLANTA, Feb. 20—A stock company has been formed in Alma, Ga., consisting of Judge T. B. Taylor, J. Q. Douglas, L. D. Luke, J. M. Johnson, of Alma, and V. H. McQuarie, of Baxley, Ga., the purpose of the company being to establish a plant for the manufacture of a new truck body. A patent is now pending on an invention by Judge Taylor, and it is said that the new body is a model of simplicity in construction, at the same time offering unusual advantages not found in most truck bodies. It is planned to establish the plant at Alma and indications are that most of the stock in the corporation will be locally owned.

MANDREL CONTRACT PLACED

BOSCOBEL, WIS., Feb. 23.—George Hunt of Boscobel, Wis., inventor and patentee of a brake band mandrel for automotive repair shops, has contracted with the Ruka Bros. Machine Co. of Boscobel for quantity production pending the erection of a new factory. Hunt has taken an order for 38,000 mandrels from the Universal Tool Co., Detroit, to be delivered at the rate of 1000 per month. To gain sufficient production, Hunt has taken over the former city electric light plant building and is installing machinery.

RESUMES TRUCK BUILDING

PONTIAC, MICH., Feb. 20—Production of trucks was resumed at the General Motors Truck plant Monday, after a shutdown in the chassis assembly line of more than a week, due to lack of materials. Illness of employees and other interruptions in the parts factories in Detroit caused the shutdown.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Martin-Parry to Add to Indianapolis Plant

INDIANAPOLIS, Feb. 20—John A. Callahan, formerly general factory manager of the Curtiss Aeroplane & Motor Corp. of Buffalo, has been elected to the board of directors of the Martin-Parry Corp. Callahan becomes vice-president and director of production of the corporation.

He will be in charge of production at the two plants, Indianapolis, where he will make his headquarters, and the other at York, Pa.

In connection with Callahan's election, it is announced $500,000 has been set aside by Martin-Parry for additions and improvements to its Indianapolis plant, making it thoroughly modern, establishing a bonus system for employees and installing new features for comfort and convenience.

Other expansion plans, which Callahan will at once put into effect, call for the doubling of present production figures in the Indianapolis factory, and for the increase of the number of employees from 700 to 1300 within the next six months.

FRASSE TO EXPAND PLANT

NEW YORK, Feb. 22—The Frasse Steel Works, Hartford, Conn., has completed plans for the reconstruction of their present plant at a cost of $100,000 to provide for expansion. It is expected that the new plant will provide an increase in the finished product from 26,000 to 40,000 tons a year. The parent corporation was a New York company, while the new concern which markets the greater part of its products in New England is incorporated under the laws of Connecticut for $1,000,000.

MAKES BODIES FOR EXPORT

LANSING, Feb. 21—The Lansing Body Co. is working on a contract for the General Motors Export Corp., which includes a number of panel bodies for shipment to Belgium. They will be placed on motor truck chassis, and will be used in the larger Belgian cities.

HOOSIER TO MAKE TRACTORS

FRANKLIN, IND., Feb. 20—Manufacture of tractors by the Hoosier Wheel Co. is to be started in a factory now under erection here by about March 15. The company has completed its organization by electing the following officers: D. A. Cox, president; Frank White, vice-president; R. A. Todd, secretary, and E. L. White, treasurer.

To Make Post-Hole Tractor in Kenosha

KENOSHA, WIS., Feb. 23—The International Earth Boring Co. of Chicago has purchased an 18-acre tract, known as the Pennoyer Sanitarium property, at Kenosha, as a site for its proposed new works, which will manufacture a creeper type of tractor truck equipped with an automatic device for boring and setting post-holes for transmission lines. The first unit of the new plant will be 130 x 300 ft., and located adjoining the works of the Winther Motor Truck Co. of Kenosha.

Work will begin about March 15 and the plant will be ready to start production on June 1. It is reported that the International company has large contracts for machines from several of the largest telegraph and telephone companies in the United States which will keep it busy at capacity for several years. The Chicago corporation is capitalized at $1,000,000 and Frances Faltmeyer is president.

DELAWARE INCORPORATIONS

WILMINGTON, DEL., Feb. 24—The following corporations have been chartered under the laws of Delaware:

Premier Motor Corp. of America, with a capital of $2,000,444, to manufacture automobiles. The incorporators are James Potter, Timothy O'Leary and Charles B. Downes, all of Philadelphia.

Gloria Motors Corp., with a capital of $5,000,000, to manufacture and sell automobiles, etc. The incorporators are Edward S. Napolis, Edgar H. Napolis and Francis E. Jaffe, all of Philadelphia.

Bowman-Gould Co., with a capital of $1,150,000, to manufacture automobiles and other vehicles. The incorporators are M. L. Horty, M. C. Kelly and S. L. Mackey, all of Wilmington.

Maumee Tire & Rubber Co., with a capital of $27,500,000, to manufacture rubber tires, inner tubes, etc. The incorporators are George Trent Morrison, Carl F. Weisenberger and Jerome B. Patterson of Toledo, O., and Robert Butler of Barberton, O.

Potomac Motor Co., Inc., of Washington, with a capital of $75,000, for the manufacture and sale of automobiles, trucks, etc. The incorporators are Elmer G. Hilgesen, Howard R. Stewart and Philip B. Key, all of Washington.

Robertson Resilient Wheel Corp. of New York, with a capital of $12,000,000, to manufacture all kinds of wheels. The incorporators are George V. Reilly, Robert K. Thistle and Harry C. Hand, all of New York.

Unity Tire & Rubber Co., with a capital of $1,000,000, to manufacture rubber tires, tubes, etc. The incorporators are T. L. Croteau, C. H. Blaske and S. E. Dill, all of Wilmington.

American Motor Patents Co., with a capital of $1,000,000, to manufacture springs, etc. The incorporators are M. L. Rogers, L. A. Irwin and W. C. Singer.

The India Rubber Corp. of South Bend, Ind., amended its charter so as to increase the capital from $1,000,000 to $2,500,000

Form British Rubber and Tire Association

LONDON, Feb. 6 (*Special Correspondence*)—There has recently been incorporated under British law an association of the rubber and tire trade, to which the Government Department of Scientific and Industrial Research has undertaken to contribute £1 for every £1 subscribed by the members of the association up to £5,000 per annum for 5 years, and a reduced rate of the same subscribed beyond that sum.

Separate sectional advisory committees will be appointed for each branch or class of rubber manufacture. The first sectional advisory committees will be four in number and will deal with the following branches respectively: Raw material, first processes and vulcanization questions; general mechanical rubber goods; rubber tires; all other rubber goods.

Further sectional advisory committees will be constituted from time to time to deal with other classes or with sub-divisions of the above classes whenever found necessary. The Board of Management is fully representative of the joint industries.

BANQUETS SENIOR LEAGUE

DETROIT, Feb. 20—More than 500 members of the Packard Senior League were banqueted in the dining-room at the Packard plant, Thursday night, in the dual celebration of the league's third anniversary and Lincoln day. The league is composed of all Packard employees who have been with the company ten years or more. Men of all departments are eligible and automatically become members with ten years' service record. Every new member receives an engraved gold watch from the company.

Judge E. J. Catrell of Philadelphia delivered the principal address at the banquet, and many officials of the Packard Motor Car Co. spoke briefly.

HYDRAULIC PLANTS RENAMED

CLEVELAND, Feb. 21—The Hydraulic Pressed Steel Co. has consolidated its interests under the name of the Hydraulic Steel Co. of Cleveland. The individual plants will be known as follows:

The Hydraulic Pressed Steel Co. of the Hydraulic Steel Co., Cleveland; the Hydraulic Steelcraft Co. of the Hydraulic Steel Co., Cleveland; the Cleveland Welding & Mfg. Co. of the Hydraulic Steel Co., Cleveland; the Canton Sheet Steel Co. of the Hydraulic Steel Co., Canton.

The executive offices of the company are in the Illuminating Building, Cleveland, with branch offices in New York, Chicago and Detroit.

GIRL'S ASSISTANT RESIGNS

CLEVELAND, Feb. 21—In connection with the resignation of Christian Girl as president of the Standard Parts Co., E. R. Finkenstaedt, who has long held the position of assistant to the president in that organization, also has resigned. Finkenstaedt will continue to make his home in Cleveland for the present, but has made no plans for the future.

Men of the Industry

Changes in Personnel and Position

W. C. Turner has been appointed district sales supervisor of the Four Wheel Drive Auto Co., Clintonville, Wis., maker of FWD trucks. He will be located at Omaha, and will cover Nebraska and Iowa. He comes from the Packard company, Chicago.

Dwight T. Hersey has taken up his new duties as director of sales of the Jenkins Vulcan Spring Co., Richmond, Ind.

George J. Mead, who has been engineer in charge of the power plants laboratory for the Air Service at Dayton, Ohio, during the past year, has resigned to become quality manager with the Wright Aeronautical Corp. at New Brunswick, N. J.

EASON LEAVES HYATT

CHICAGO, Feb. 20—C. F. Eason, chairman of the Hyatt Roller Bearing Co., tractor bearing division, has resigned to take charge of the newly organized Moline Engineering Development Co., at Moline, Ill. Eason will continue in the Hyatt organization in an advisory capacity. The new organization will specialize in investigational and advisory work along engineering lines, especially in connection with the construction of tractors and other farm implements.

KEEN JOINS HESS COMPANY

BALTIMORE, Feb. 20—H. W. Keen recently resigned as factory manager of the United States Copper Products Corp., Cleveland, to become manager of tool steel production for the Hess Steel Corp. here. He is well known in the trade, having been connected with the Firth Sterling Steel Co., later known as the Washington Steel & Ordnance Co., at Washington, D. C., where he held the position of metallurgical superintendent.

DURSTON NAMES OFFICIALS

SYRACUSE, N. Y., Feb. 21—At the annual stockholders' meeting of the Durston Gear Corp., R. M. Beam, sales-manager and A. C. Bryan, battery manager, were elected directors and vice-presidents. Both have been associated with the corporation since 1913.

ANDERSON CHANGES TITLE

DETROIT, Feb. 19—The corporate name of the Anderson Forge & Machine Co. was changed at the stockholders' meeting Feb. 6, to the Jefferson Forge Products Co. The capital stock was increased from $700,000 to $1,000,000. Officers and organization remain the same.

Owen-Magnetic Plans 600 Production in 1920

PHILADELPHIA, Feb. 21.—Plans have been approved for the erection of a large addition to the factory of the Owen-Magnetic Automobile Co., at Forty-Fort, Pa., which will cover several lots adjacent to the present buildings. The housing proposition is so serious that the company also is considering erecting its own houses for employees.

N. C. Owen, general manager of the concern, has announced that the company just at present is in need of about 100 additional hands, both skilled and unskilled. Toolmakers are scarce in the State, and because of the housing shortage, labor is not over-anxious to settle in the vicinity. It is expected that after April 1 the labor situation will be even more stringent.

Many employees are now living in houses that have either been sold since they moved in or else have been rented to other tenants. Despite any of these handicaps, the factory management states that the company will produce its first car for the public market the latter part of March and that others will follow in quick succession until a "stride" of production is struck and maintained. The output for 1920, numbering 600 cars in prospect, has been contracted for by various dealers and distributors.

A car was manufactured for exhibition at the New York and Philadelphia shows and within several days thereafter the factory output was contracted for.

LUTHER PERSONNEL CHANGED

MILWAUKEE, Feb. 20—The Luther Grinder Mfg. Co., Milwaukee, has reorganized its official personnel, following the purchase of the controlling interest from S. S. and L. I. Newton by William T. Hardy and Capt. W. E. V. Shaw of Milwaukee. Hardy has been elected president and Captain Shaw, secretary and treasurer. The company manufactures tool grinders, vises and post drills. Hardy has been associated with the business for several years. Captain Shaw returned recently after five years of active duty with the Canadian field artillery.

HEADS REPUBLIC RUBBER

NEW YORK, Feb. 20—E. S. Jones has been elected president of the Republic Rubber Corp., to succeed G. E. Norwood, who will remain a member of the board of directors temporarily.

CHANGE FIRM TITLE

CHICAGO, Feb. 19—The name of the Anderson Electric Specialty Co. has been changed to Anderson Electric & Equipment Co. There is no change in the organization.

H. M. DAVIS DIES

NEW YORK, Feb. 20—H. M. Davis, advertising manager of the Sprague Electric Works of the General Electric Co., died at his Brooklyn home, Feb. 9, after an illness of three weeks.

Calendar

SHOWS

Feb. 28-March 6—York, Pa. Annual Automobile Show, York County Dealers' Assn., Overland-Harrisburg Garage. R. A. Anderson, Manager.

Mar. 1-6—Springfield, Mass. Annual Automobile Show. Auditorium. Springfield Automotive Dealers' Assn. Robert H. Clark, Manager.

Mar. 1-6—St. Joseph, Mo. Annual Automobile Show. St. Joseph Automobile Show Assn. Auditorium. John Albus, Manager.

Mar. 1-6—Grand Rapids, Mich. Truck Show. Furniture Exposition Bldg. M. D. Elgin. Manager.

Mar. 1-7—Springfield, Mass. Annual Automobile Show. Springfield Automobile Dealers' Assn. Harry Stacy, Secretary.

Mar. 1-8—Seattle. State Armory. Motor Car Dealers' Assn. William J. Coyle, Manager.

Mar. 2-6—Springfield, Ill. Annual Automobile Show. Springfield Auto Dealers' Assn. John Brodhead, Manager.

March 3-6—Clinton, Ia. Annual Automobile Show. Clinton County Automobile Dealers' Assn., Coliseum. Harry G. Finch, Manager.

March 6-13—New York, N. Y. Second Annual Aeronautical Exposition, Manufacturers' Aircraft Assn., Inc., 71st Regiment Armory. Walter Hempel, Manager.

Mar. 6-13 — Greenville, S. C. Carolina Automobile Show. Greenville Dealers' Assn. Textile Hall.

Mar. 7-13—Muskegon, Mich. Automobile Show. Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.

Mar. 8-13—Indianapolis, Ind. Annual Automobile Show, Indianapolis Auto Trade Assn. Manufacturers' Bldg. State Fair Grounds. John B. Orman, Manager.

Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.

Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.

Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.

Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.

Mar. 20-27—Pittsburgh. Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.

Mar. 22-27—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.

Mar. 22-27—Utica, N. Y. Annual Automobile Show, Utica Motor Dealers' Association.

Mar. 22-27 — Oklahoma City, Okla. Annual Automobile Show. Oklahoma City Motor Car Dealers' Assn. G. W. Woods, Manager.

April 21-28—San Francisco. National Aeronautic Exposition. Exposition Auditorium.

Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker, Manager.

FOREIGN SHOWS

Feb. 22-28—Ottawa, Ontario. Motor Show.

Feb. 22-March 6—Birmingham, England. British Industries Fair.

March—London, England. Motor Boat Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.

April or May—London, England. Commercial Vehicle Exhibition. Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

CONTESTS

August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.

June, 1920—Omaha, Neb. Reliability Truck Tour.

CONVENTIONS

May 9-12—Independent American Petroleum Congress, Congress Hotel, Chicago.

May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

S. A. E. MEETINGS

Feb. 25—Motor Boat Meeting S. A. E. Headquarters, New York. (Evening Session.)

Feb. 27—Midwest Section, Chicago.

Feb. 27-28 Pittsburgh Section. Visit Braeburn Steel Co. Plant, Braeburn, Pa.

Mar. 10—Aeronautic Dinner and Meeting. S. A. E. Headquarters, New York.

States Ready to Pass Hudson Tunnel Plans

NEW YORK, Feb. 20 — Considerable interest attaches at this time to the report of the New York State Bridge and Tunnel Commission on the projected vehicular tunnel to connect lower Manhattan with Jersey City. The report was submitted to Governor Smith and the New York State Legislature, Saturday. The New Jersey report, which is similar to the New York document, will be submitted to the Legislature of that State at a public hearing. The estimated cost of the tunnel is $28,669,000. The present plan contemplates the beginning of the actual construction work in September next, and the opening of the tunnel in January, 1924.

Of special interest are the plans to provide sufficient ventilation for the new bore, the principal danger to which is carbon-monoxide discharges from the exhausts of motor driven vehicles. To provide proper ventilation the plans call for two ducts, one underneath the roadbed through which the fresh air will be drawn into the tube and the other overhead, through which the foul air will be drawn off. Four ventilation shafts are provided, one at each end inside the pierhead line and one at each end on shore.

"The problem of providing sufficient fresh air," the report says, "has been investigated in detail by testing automobiles to determine the amount and composition of the exhaust gases given off by cars under operating conditions and by determining the amount of dilution required to render these exhaust gases harmless. This work is being done under contract with the Bureau of Mines at its Experimental Station at Pittsburgh, Pa., and New Haven, Conn. There is absolutely no question as to the feasibility or practicability of ventilating the vehicular tunnel at a reasonable cost."

The report estimates that approximately 60,000 tons of freight is lightered across the Hudson over the various ferry routes every day and at least one-sixth of this will seek the tunnel. It is pointed out that the new tube will considerably facilitate the transportation of food products into New York.

ALABAMA VOTES ROADS

ATLANTA, Feb. 20—The State of Alabama this week voted in favor of the issuance of $25,000,000 for the construction and improvement of state roads. The Federal Government appropriates a similar amount for the same purpose so Alabama will have $50,000,000 on hand for goods roads.

W. S. Keller, state highway engineer, stated that road engineers would begin a complete survey of the state in the course of the next three or four months.

To Absorb Gasoline from Natural Gas

WASHINGTON, Feb. 20—A paper dealing with the recovery of gasoline, by means of the absorption process, from the residual gas in plants where motor fuel is obtained from natural gas by mechanical compression and cooling, has just been issued by the Bureau of Mines, Department of the Interior, as Technical Paper 232, W. P. Dykema and Roy O. Neal, authors. In the absorption process the gasoline present in the natural gas is absorbed by oil and subsequently separated from the oil by distillation or is absorbed in naphtha.

The purpose of the paper is to point out more efficient methods of production of gasoline and motor fuel. The vast amount of motor fuel being consumed at the present time, and particularly the rapid advance in consumption of the product, due to the increase in the manufacture of automobile trucks, tractors, etc., that has taken place over a very few years, the paper says, makes conservation a paramount problem.

The investigation was carried on by actual field demonstrations, and from the thirty plants tested throughout the Mid-Continent field it was ascertained that there still remained in the gas after it has been subjected to final treatment in the plant an average of .337 gal. of gasoline for every 1000 cu. ft.